

SECTION I

CONTRACT CLAUSES

I-1 CLAUSES INCORPORATED BY REFERENCE (52.252-2) (JUN 1988)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available.

(End of clause)

NOTICE: The following clauses are hereby incorporated by reference:

A. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)
CLAUSES

<u>Clause No.</u>	<u>Title</u>
52.202-1	Definitions (Sep 1991)
52.203-1	Officials Not to Benefit (Apr 1984)
52.203-3	Gratuities (Apr 1984)
52.203-5	Covenant Against Contingent Fees (Apr 1984)
52.203-6	Restrictions on Subcontractor Sales to the Government (Jul 1985)
52.203-7	Anti-Kickback Procedures (Oct 1988)
52.203-10	Price or Fee Adjustment for Illegal or Improper Activity (Sep 1990)
52.203-12	Limitation on Payments to Influence Certain Federal Transactions (Jan 1990)
52.204-2	Security Requirements (Apr 1984)
52.208-1	Required Sources for Jewel Bearings and Related Items (Apr 1984)
52.209-6	Protecting the Government's Interest when Subcontracting with Contractors Debarred, Suspended, or Proposed for Debarment (Nov 1992)
52.210-5	New Material (Apr 1984)
52.210-7	Used or Reconditioned Material, Residual Inventory, and Former Government Surplus Property (Apr 1984)
52.212-8	Defense Priority and Allocation Requirements (Sep 1990)
52.215-1	Examination of Records by Comptroller General (Feb 1993)
52.215-2	Audit -- Negotiations (Feb 1993)
52.215-21	Changes or Additions to Make-or-Buy Programs (Apr 1984)
52.215-22	Price Reduction for Defective Cost or Pricing Data (Jan 1991)
52.215-24	Subcontractor Cost or Pricing Data (Dec 1991)
52.215-26	Integrity of Unit Prices (Apr 1991) -- Alternate I (Apr 1991)

FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES
(Continued)

<u>Clause No.</u>	<u>Title</u>
52.215-27	Termination of Defined Benefit pension Plans (Sep 1989)
52.215-33	Order of Precedence (Jan 1986)
52.215-39	Reversion or Adjustment of Plans for Postretirement Benefits other than Pensions (PRB) (Jul 1991)
52.216-7	Allowable Cost and payment (Mar 2000)
52.216-8	Fixed Fee (Apr 1984)
52.219-8	Utilization of Small Business Concerns and Small Disadvantaged Business Concerns (Feb 1990)
52.219.9	Small Business and Small Disadvantaged Business Subcontracting Plan (Jan 1991)
52.219-13	Utilization of Women-Owned Small Businesses (Aug 1986)
52.219-16	Liquidated Damages -- Small Business Subcontracting Plan (Aug 1989)
52.220-3	Utilization of Labor Surplus Area Concerns (Apr 1984)
52.220-4	Labor Surplus Area Subcontracting Program (Apr 1984)
52.222-1	Notice to the Government of Labor Disputes (Apr 1984)
52.222-20	Walsh-Healey Public Contracts Act (Apr 1984)
52.222-26	Equal Opportunity (Apr 1984)
52.222-28	Equal Opportunity Preaward Clearance of Subcontracts (Apr 1984)
52.222-35	Affirmative Action for Special Disabled and Vietnam Era Veterans (Apr 1984)
52.222-36	Affirmative Action for Handicapped Workers (Apr 1984)
52.222-37	Employment Reports on Special Disabled Veterans and Veterans of the Vietnam Era (Jan 1988)
52.223-2	Clean Air and Water (Apr 1984)
52.223-6	Drug-Free Workplace (Jul 1990)
52.224-1	Privacy Act Notification (Apr 1984)
52.224-2	Privacy Act (Apr 1984)
52.225-3	Buy American Act -- Supplies (Jan 1989)
52.225-11	Restrictions on Certain Foreign Purchases (May 1992)
52.227-1	Authorization and Consent (Apr. 1984) -- Alternate I (Apr 1984)
52.227-2	Notice and Assistance Regarding Patent and Copyright Infringement (Apr 1984)
52.227-14	Rights in Data -- General (Jun 1987) -- As Modified by NASA FAR Supplement 18-52.227-14 -- Alternate I (Jun 1987) -- Alternate II (Jun 1987) -- Alternate III (Jun 1987) -- Alternate V (Jun 1987)
52.227-16	Additional Data Requirements (Jun 1987)
52.228-7	Insurance -- Liability to Third Persons (Apr 1984)
52.230-3	Disclosure and Consistency of Cost Accounting Practices (Aug 1992)
52.230-5	Administration of Cost Accounting Standards (Aug 1992)

FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES
(Continued)

<u>Clause No.</u>	<u>Title</u>
52.232-9	Limitation on Withholding of Payments (Apr 1984)
52.232-17	Interest (Jan 1991)
52.232-22	Limitation of Funds (Apr 1984)
52.232-23	Assignment of Claims (Jan 1986)
52.232-25	Prompt Payment (Sep 1992) (Insert 10th day for the period July 1, 1994 through December 31, 1998, subparagraph (b)(2))
52.232-28	Electronic Funds Transfer Payment Methods (Apr 1989) -- As Modified by NASA FAR Supplement 18-32.908(a)
52.233-1	Disputes (Dec 1991) -- Alternate I (Dec 1991)
52.233-3	Protest After Award (Aug 1989) -- Alternate I (Jun 1985)
52.237-2	Protection of Government Buildings, Equipment, and Vegetation (Apr 1984)
52.242-1	Notice of Intent to Disallow Costs (Apr 1984)
52.242-13	Bankruptcy (Apr 1991)
52.243-2	Changes -- Cost-Reimbursement (Aug 1987) -- As Modified by NASA FAR Supplement 18-43.205 -- Alternate V (Apr 1984) (Insert "60 days" in lieu of "30 days" in paragraph (c))
52.244-2	Subcontracts (Cost-Reimbursement and Letter Contracts)(Jul 1985) -- Alternate I (Apr 1985)
52.244-5	Competition in Subcontracting (Apr 1984)
52.245-5	Government property (Cost-Reimbursement, Time-and-Material, or Labor-hour Contracts) (Jan 1986)
52.245-18	Special Test Equipment (Feb 1993)
52.246-24	Limitation of Liability -- High-Value Items (Apr 1984)
52.247-1	Commercial Bill of Lading Notations (Apr 1984)
52.247-64	Preference for Privately Owned U.S. - Flag Commercial Vessels (Apr 1984) -- Alternate I (Apr 1984)
52.248-1	Value Engineering (Mar 1989)
52.249-6	Termination (Cost-Reimbursement)(May 1986)
52.249-14	Excusable Delays (Apr 1984)
52.251-1	Government Supply Sources (Apr 1984)
52.251-2	Interagency Fleet Management System (IFMS) Vehicles and Related Services (Jan 1991)
52.253-1	Computer Generated Forms (Jan 1991)

B. NASA/FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

<u>Clause No.</u>	<u>Title</u>
18-52.204-70	Report on NASA Subcontracts (Nov 1992)
18-52.204-71	NASA Contractor Financial Management Reporting (Dec 1988)

B. NASA/FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES
(Continued)

<u>Clause No.</u>	<u>Title</u>
18-52.212-70	Notice of Delay (Dec 1988)
18-52.216-76	Award Fee (Dec 1991)
18-52.219-74	Use of Rural Area Small Businesses (Sep 1990)
18-52.219-75	Small Business and Small Disadvantaged Business Subcontracting Reporting (Sep 1992)
18-52.219-76	NASA Small Disadvantaged Business Goal (Jul 1991)
18-52.223-70	Safety and Health (Dec 1988)
18-52.227-70	New Technology (Apr 1988)
18-52.228-72	Interparty Waiver of Liability During STS Operations (Dec 1988)
18-52.235-70	Center for AeroSpace Information (Nov 1992)
18-52.244-70	Geographic Participation in the Aerospace Program (Apr 1985)
18-52.245-70	Acquisition of Centrally Reportable Equipment (Mar 1989)
18-52.245-71	Installation-Provided Government Property (Mar 1989)
18-52.247-71	Protection of the Florida Manatee (Mar 1989)
18-52.250-70	Indemnification Under public law 85-804 -- NASA Contracts (Sep 1989) - - Alternate I (Mar 1989)
18-52.250-72	Space Activity -- Unusually Hazardous Risks (Mar 1989)

I.2 REPRESENTATIONS, CERTIFICATIONS, AND OTHER STATEMENTS OF OFFERS OR QUOTERS INCORPORATED BY REFERENCE (MSFC--52.252-91)
AUG 1988)

The Representations, Certifications, and Other Statements of Offers or Quoters (Section K of the solicitation document) as completed by the Contractor are hereby incorporated in their entirety by reference, with the same force and effect as if they were given in full text.

(End of clause)

I.3 FULL TEXT CLAUSES (MSFC--52.252-90)(AUG 1988)

The following clauses are attached hereto in full text:

<u>Clause No.</u>	<u>Title</u>
52.216-10	Incentive Fee (Apr 1984)

FULL TEXT CLAUSES (MSFC--52.252-90)(AUG 1988)
(Continued)

<u>Clause No.</u>	<u>Title</u>
52.223-3	Hazardous Material Identification and Material Safety Data (Nov 1991) -- Alternate I (Nov 1991)
52.227-9	Refund of Royalties (Apr 1984)
52.243-7	Notification of Changes (Apr 1984)
1852.204-76	Security Requirements for Unclassified Information Technology Resources (July 2000)
1852.252-70	Compliance with NASA FAR Supplement (Mar 1989)

(End of clause)

(END OF SECTION)

52-203-9

REQUIREMENT FOR CERTIFICATE OF PROCUREMENT INTEGRITY
MODIFICATION (NOV 1990)

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52.216-10 INCENTIVE FEE (APR 1984)

(a) General. The Government shall pay the Contractor for performing this contract a fee determined as provided in this contract.

(b) Target cost and target fee. The target cost and target fee specified in the schedule are subject to adjustment if the contract is modified in accordance with paragraph (d) below.

(1) "Target cost," as used in this contract, means the estimated costs of this contract as initially negotiated, adjusted in accordance with paragraph (d) below.

(2) "Target Fee," as used in this contract, means the fee initially negotiated on the assumption that this contract would be performed for a cost equal to the estimated cost initially negotiated, adjusted in accordance with paragraph (d) below.

(c) Withholding of payment. Normally, the Government shall pay the fee to the Contractor as specified in the Schedule. However, when the Contracting Officer considers that performance or cost indicates that the Contractor will not achieve target, the Government shall pay on the basis of an appropriate lesser fee. When the Contractor demonstrates that performance or cost clearly indicates that the Contractor will earn a fee significantly above the target fee, the Government may, at the sole discretion of the Contracting Officer, pay on the basis of an appropriate higher fee. After payment of 85 percent of the applicable fee, the Contracting Officer may withhold further payment of fee until a reserve is set aside in an amount that the Contracting Officer considers necessary to protect the Government's interest. This reserve shall not exceed 15 percent of the applicable fee or \$100,000, whichever is less.

(d) Equitable adjustments. When the work under this contract is increased or decreased by a modification to this contract or when any equitable adjustment in the target cost is authorized under any other clause, equitable adjustments in the target cost, target fee, minimum fee, and maximum fee, as appropriate, shall be stated in a supplemental agreement to this contract.

(e) Fee payable

(1) The fee payable under this contract shall be the target fee increased by 40 cents for every dollar that the total allowable cost is less than the target cost or decreased by 100 cents for every dollar that the total allowable cost exceeds the target cost. In no event shall the fee be greater than 11 percent or less than 0 percent of the target cost.

(2) The fee shall be subject to adjustment, to the extent provided in paragraph (d) above, and within the minimum and maximum fee limitations in subparagraph (1) above, when the total allowable cost is increased or decreased as a consequence of (i) payments made under assignments or (ii) claims excepted from the release as required by paragraph (h)(2) of the Allowable Cost and Payment clause.

(3) If this contract is terminated in its entirety, the portion of the target fee payable shall not be subject to an increase or decrease as provided in this paragraph. The termination shall be accomplished in accordance with other applicable clauses of this contract.

(4) For the purpose of fee adjustment, "total allowable cost" shall not include allowable costs arising out of --

(i) Any of the causes covered by the Excusable Delays clause to the extent that they are beyond the control and without the fault or negligence of the Contractor or any subcontractor;

(ii) The taking effect, after negotiating the target cost, of a statute, court decision, written ruling, or regulation that results in the Contractor's being required to pay or bear the burden of any tax or duty or rate increase in a tax or duty;

(iii) Any direct cost attributed to the Contractor's involvement in litigation as required by the Contracting Officer pursuant to a clause of this contract, including furnishing evidence and information requested pursuant to the Notice and Assistance Regarding Patent and Copyright Infringement clause;

(iv) The purchase and maintenance of additional insurance not in the target cost and required by the Contracting Officer, or claims for reimbursement for liabilities to third persons pursuant to the Insurance -- Liability to Third Persons clause;

(v) Any claim, loss, or damage resulting from a risk for which the Contractor has been relieved of liability by the Government Property clause; or

(vi) Any claim, loss, or damage resulting from a risk defined in the contract as unusually hazardous or as a nuclear risk and against which the Government has expressly agreed to indemnify the Contractor.

(5) All other allowable costs are included in "total allowable cost" for fee adjustment in accordance with this paragraph (e), unless otherwise specifically provided in this contract.

(f) Contract modification. The total allowable cost and the adjusted fee determined as provided in this clause shall be evidenced by a modification to this contract signed by the Contractor and Contracting Officer.

(g) Inconsistencies. In the event of any language inconsistencies between this clause and provisioning documents or Government options under this contract, compensation for spare parts or other supplies and services ordered under such documents shall be determined in accordance with this clause.

(End of Clause)

52.223-3 HAZARDOUS MATERIAL IDENTIFICATION AND MATERIAL SAFETY
DATA (NOV 1991) -- ALTERNATE I (NOV 1991)

(a) "Hazardous Material", as used in this clause, includes any material defined as hazardous under the latest version of Federal Standard No. 313 (including revisions adopted during the term of the contract).

(b) The offeror must list any hazardous material, as defined in paragraph (a) of this clause, to be delivered under this contract. The hazardous material shall be properly identified and include any applicable identification number, such as National Stock Number or Special Item Number. This information shall also be included on the Material Safety Data Sheet submitted under this contract.

Material	Identification No.
<u>External Tank</u>	<u>CPT01M09A, Part I</u>
<u>External Tank</u>	<u>CPT01M09A, Part II</u>

(c) The apparently successful offeror, by acceptance of the contract, certifies that the list in paragraph (b) of this clause is complete. This list must be updated during performance of the contract whenever the Contractor determines that any other material to be delivered under this contract is hazardous.

(d) The apparently successful offeror agrees to submit, for each item as required prior to award, a Material Safety Data Sheet, meeting the requirements of 29 CFR 1910.1200(g) and the latest version of Federal Standard No. 313, for all hazardous material identified in paragraph (b) of this clause. Data shall be submitted in accordance with Federal Standard No. 313, whether or not the apparently successful offeror is the actual manufacturer of these items. Failure to submit the Material Safety Data Sheet prior to considered nonresponsible and ineligible for award.

(e) If, after award, there is a change in the composition of the item(s) or a revision to Federal Standard No. 313, which renders incomplete or inaccurate the data submitted under paragraph (d) of this clause or the certification submitted under paragraph (c) of this clause, the Contractor shall promptly notify the Contracting Officer and resubmit the data.

(f) Neither the requirements of this clause nor any act or failure to act by the Government shall relieve the Contractor of any failure to act by the Government shall relieve the Contractor of any responsibility or liability for the Safety of Government, Contractor, or subcontractor personnel or property.

(g) Nothing contained in this clause shall relieve the Contractor from complying with applicable Federal, State, and local laws, codes, ordinances, and regulations (including the obtaining of licenses and permits) in connection with hazardous material.

(h) The Government's rights in data furnished under this contract with respect to hazardous materials are as follows:

(1) To use, duplicate, and disclose any data to which this clause is applicable. The purposes of this right are to --

(i) Apprise personnel of the hazards to which they may be exposed in using, handling, packaging, transporting, or disposing of hazardous materials;

(ii) Obtain medical treatment for those affected by the material; and

(iii) Have others use, duplicate, and disclose the data for the Government for these purposes.

(2) To use, duplicate, and disclose data furnished under this clause, in accordance with subparagraph (h)(1) of this clause, in precedence over any other clause of this contract providing for rights in data.

(3) The Government is not precluded from using similar or identical data acquired from other sources.

(i) Except as provided in paragraph (l)(2), the Contractor shall prepare and submit a sufficient number of Material Safety Data Sheets (MSDS's), meeting the requirements of 29 CFR 1910.1200(g) and the latest version of Federal Standard No. 313, for all hazardous materials identified in paragraph (b) of this clause.

(1) For items shipped to consignees, the Contractor shall include a copy of the MSDS's with the packing list or other suitable shipping document which accompanies each shipment. Alternatively, the Contractor is permitted to mail MSDS's to consignees in advance of receipt of shipments by consignees, if authorized in writing by the Contracting Officer.

(2) For items shipped to consignees identified by mailing address as agency depots, distribution centers or customer supply centers, the Contractor shall provide one copy of the MSDS's in or on each shipping container. If affixed to the outside of each container, the MSDS's must be placed in a weather resistant envelop.

(End of clause)

52.227-9 REFUND OF ROYALTIES (APR 1984)

(a) The contract price includes certain amounts for royalties payable by the Contractor or subcontractors or both, which amounts have been reported to the Contracting Officer.

(b) The term "royalties" as used in this clause refers to any costs or charges in the nature of royalties, license fees, patent or license amortization costs, or the like, for the use of or for rights in patents and patent applications in connection with performing this contract or any subcontract hereunder.

(c) The Contractor shall furnish to the Contracting Officer, before final payment under this contract, a statement of royalties paid or required to be paid in connection with performing this contract and subcontracts hereunder together with the reasons.

(d) The Contractor will be compensated for royalties reported under paragraph (c) above, only to the extent that such royalties were included in the contract price and are determined by the Contracting Officer to be properly chargeable to the Government and allocable to the contract. To the extent that any royalties that are included in the contract price are not in fact paid by the Contractor or are determined by the Contracting Officer not to be properly chargeable to the Government and allocable to the Contract, the contract price shall be reduced. Repayment or credit to the Government shall be made as the Contracting Officer directs.

(e) If, at any time within 3 years after final payment under this contract, the Contractor for any reason is relieved in whole or in part from the payment of royalties included in the final contract price as adjusted pursuant to paragraph (d) above, the Contractor shall promptly notify the Contracting Officer of that fact and shall reimburse the Government in a corresponding amount.

(f) The substance of this clause, including this paragraph (f), shall be included in any subcontract in which the amount of royalties reported during negotiation of the subcontract exceeds \$250.

(End of Clause)

For paragraphs (c) and (f) above, the following information will be provided:

- (1) Name and address of licensor.
- (2) Date of license agreement.
- (3) Patent numbers, patent application serial numbers, or other basis on which the royalty is payable.
- (4) Brief description, including any part or model numbers of each contract item or component on which the royalty is payable.
- (5) Percentage or dollar rate of royalty per unit.
- (6) Unit price of contract item.
- (7) Number of units.
- (8) Total dollar amount of royalties.

52.243-7 NOTIFICATION OF CHANGES (APR 1984)

(a) Definitions. "Contracting Officer," as used in this clause, does not include any representative of the Contracting Officer. "Specifically authorized representative (SAR)," as used in this clause, means any person the Contracting Officer has to designated by written notice (a copy of which shall be provided to the Contractor) which shall refer to this subparagraph and shall be issued to the designated representative before the SAR exercises such authority.

(b) Notice. The primary purpose of this clause is to obtain prompt reporting of Government conduct that the Contractor considers to constitute a change to this contract. Except for changes identified as such in writing and signed by the Contracting Officer, the Contractor shall notify the Administrative Contracting Officer in writing promptly, within 10 calendar days from the date that the Contractor identifies any Government conduct (including actions, inactions, and written or oral communications) that the contractor regards as a change to the contract terms and conditions. On the basis of the most accurate information available to the Contractor, the notice shall state --

(1) The date, nature, and circumstances of the conduct regarded as a change;

(2) The name, function, and activity of each government individual and Contractor Official or employee involved in or knowledgeable about such conduct;

(3) The identification of any documents and the substance of any oral communication involved in such conduct;

(4) In the instance of alleged acceleration of scheduled performance or delivery, the basis upon which it arose;

(5) The particular elements of contract performance for which the Contractor may seek an equitable adjustment under this clause, including --

(i) What contract line items have been or may be affected by the alleged change;

(ii) What labor or materials or both have been or may be added, deleted, or wasted by the alleged change;

(iii) To the extent practicable, what delay and disruption in the manner and sequence of performance and effect on continued performance have been or may be caused by the alleged change;

(iv) What adjustments to contract price, delivery schedule, and other provisions affected by the alleged change are estimated; and

(6) The Contractor's estimate of time by which the Government must respond to the Contractor's notice to minimize cost, delay or disruption of performance.

(c) Continued performance. Following submission of the notice required by (b) above, the Contractor shall diligently continue performance of this contract to the maximum extent possible in accordance with its terms and conditions as construed by the Contractor, unless the notice reports a direction of the Contracting Officer or a communication from a SAR of the Contracting Officer, in

either of which events the Contractor shall continue performance; provided, however, that if the Contractor regards the direction or communication as a change as described in (b) above, notice shall be given in the manner provided. All directions, communications, interpretations, orders and similar actions of the SAR shall be reduced to writing promptly and copies furnished to the Contractor and to the Contracting Officer. The Contracting Officer shall promptly countermand any action which exceeds the authority of the SAR.

(d) Government response. The Contracting Officer shall promptly, within 8 calendar days after receipt of notice, respond to the notice in writing. In responding, the Contracting Officer shall either --

- (1) Confirm that the conduct of which the Contractor gave notice constitutes a change and when necessary direct the mode of further performance;
- (2) Countermand any communication regarded as a change;
- (3) Deny that the conduct of which the Contractor gave notice constitutes a change and when necessary direct the mode of further performance; or
- (4) In the event the Contractor's notice information is inadequate to make a decision under (1), (2), or (3) above, advise the Contractor what additional information is required, and establish the date by which it should be furnished and the date thereafter by which the Government will respond.

(e) Equitable adjustments.

(1) If the Contracting Officer confirms that Government conduct effected a change as alleged by the Contractor, and the conduct causes an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work under this contract, whether changed or not changed by such conduct, an equitable adjustment shall be made --

- (i) In the contract price or delivery schedule or both; and
 - (ii) In such other provisions of the contract as may be affected.
- (2) The contract shall be modified in writing accordingly. In the case of drawings, designs or specifications which are defective and for which the Government is responsible, the equitable adjustment shall include the cost and time extension for delay reasonably incurred by the Contractor in attempting to comply with the defective drawings, designs or specifications before the Contractor identified, or reasonably should have identified, such defect. When the cost of property made obsolete or excess as a result of a change confirmed by the contracting officer under this clause is included in the equitable adjustment, the Contracting Officer shall have the right to prescribe the manner of disposition of the property. The equitable adjustment shall not include increased costs or time extensions for delay resulting from the Contractor's failure to provide notice or to continue performance as provided respectively, in (b) and (c) above.

NOTE: The phrases "contract price" and "cost" wherever they appear in the clause, may be appropriately modified to apply to Cost-reimbursement or incentive contracts, or to combinations thereof.

(End of clause)

1852.204-76 SECURITY REQUIREMENTS FOR UNCLASSIFIED INFORMATION
TECHNOLOGY RESOURCES (JULY 2000)

a) The Contractor shall comply with the security requirements outlined in NASA Policy Directive (NPD) 2810.1, Security of Information Technology, and NASA Procedures and Guidelines (NPG) 2810.1, Security of Information Technology. These policies apply to all IT systems and networks under NASA's purview operated by or on behalf of the Federal Government, regardless of location.

(b) (1) The Contractor shall ensure compliance by its employees with Federal directives and guidelines that deal with IT Security including, but not limited to, OMB Circular A-130, Management of Federal Information Resources, OMB Circular A-130 Appendix III, Security of Federal Automated Information Resources, the Computer Security Act of 1987 (40 U.S.C. 1441 et seq.), and all applicable Federal Information Processing Standards (FIPS).

(2) All Federally owned information is considered sensitive to some degree and must be appropriately protected by the Contractor as specified in applicable IT Security Plans. Types of sensitive information that may be found on NASA systems that the Contractor may have access to include, but are not limited to --

(i) Privacy Act information (5 U.S.C. 552a et seq.);

(ii) Export Controlled Data, (e.g. Resources protected by the International Traffic in Arms Regulations (22 CFR Parts 120-130)).

(3) The Contractor shall ensure that all systems connected to a NASA network or operated by the Contractor for NASA conform with NASA and Center security policies and procedures.

(c) (1) The Contractor's screening of Contractor personnel will be conducted in accordance with NPG 2810.1, Section 4.5 for personnel requiring unescorted or unsupervised physical or electronic access to NASA systems, programs, and data.

(2) The Contractor shall ensure that all such employees have at least a National Agency Check investigation. The Contractor shall submit a personnel security questionnaire (NASA Form 531), Name Check Request for National Agency Check (NAC) investigation, and Standard Form 85P, Questionnaire for Public Trust Positions (for specified sensitive positions), and a Fingerprint Card (FD-258 with NASA overprint in Origin Block) to the Center Chief of Security for each Contractor employee requiring screening. The required forms may be obtained from the Center Chief of Security. In the event that the

NAC is not satisfactory, access shall not be granted. At the option of the Government, background screenings may not be required for employees with recent or current Federal Government investigative clearances.

(3) The Contractor shall have an employee checkout process that ensures--

(i) Return of badges, keys, electronic access devices and NASA equipment;

(ii) Notification to NASA of planned employee terminations at least three days in advance of the employee's departure. In the case of termination for cause, NASA shall be notified immediately. All NASA accounts and/or network access granted terminated employees shall be disabled immediately upon the employee's separation from the Contractor; and

(iii) That the terminated employee has no continuing access to systems under the operation of the Contractor for NASA. Any access must be disabled the day the employee separates from the Contractor.

(4) Granting a non-permanent resident alien (foreign national) access to NASA IT resources requires special authorization. The Contractor shall obtain authorization from the Center Chief of Security prior to granting a non-permanent resident alien access to NASA IT systems and networks.

(d) (1) The Contractor shall ensure that its employees with access to NASA information resources receive annual IT security awareness and training in NASA IT Security policies, procedures, computer ethics, and best practices.

(2) The Contractor shall employ an effective method for communicating to all its employees and assessing that they understand any Information Technology Security policies and guidance provided by the Center Information Technology Security Manager (CITSM) and/or Center CIO Representative as part of the new employee briefing process. The Contractor shall ensure that all employees represent that they have read and understand any new Information Technology Security policy and guidance provided by the CITSM and Center CIO Representative over the duration of the contract.

(3) The Contractor shall ensure that its employees performing duties as system and network administrators in addition to performing routine maintenance possess specific IT security skills. These skills include the following:

- (i) Utilizing software security tools.
- (ii) Analyzing logging and audit data.
- (iii) Responding and reporting to computer or network incidents as per NPG 2810.1.
- (iv) Preserving electronic evidence as per NPG 2810.1.
- (v) Recovering to a safe state of operation.

(4) The Contractor shall provide training to employees to whom they plan to assign system administrator roles. That training shall provide the employees with a full level of proficiency to meet all NASA system administrators' functional requirements. The Contractor shall have methods or processes to document that employees have mastered the training material, or have the required knowledge and skills. This applies to all system administrator requirements.

(e) The Contractor shall promptly report to the Center IT Security Manager any suspected computer or network security incidents occurring on any system operated by the Contractor for NASA or connected to a NASA network. If it is validated that there is an incident, the Contractor shall provide access to the affected system(s) and system records to NASA and any NASA designated third party so that a detailed investigation can be conducted.

(f) The Contractor shall develop procedures and implementation plans that ensure that IT resources leaving the control of an assigned user (such as being reassigned, repaired, replaced, or excessed) have all NASA data and sensitive application software permanently removed by a NASA- approved technique. NASA-owned applications acquired via a "site license" or "server license" shall be removed prior to the resources leaving NASA's use. Damaged IT storage media for which data recovery is not possible shall be degaussed or destroyed. If the assigned task is to be assumed by another duly authorized person, at the Government's option, the IT resources may remain intact for assignment and use of the new user.

(g) The Contractor shall afford NASA, including the Office of Inspector General, access to the Contractor's and subcontractor's facilities, installations, operations, documentation, databases and personnel. Access shall be provided to the extent required to carry out a program of IT inspection, investigation and audit to safeguard against threats and hazards to the integrity, availability and confidentiality of NASA data, and to preserve evidence of computer crime.

(h) (1) The Contractor shall document all vulnerability testing and risk assessments conducted in accordance with NPG 2810.1 and any other IT security requirements specified in the contract or as directed by the Contracting Officer.

(2) The results of these tests shall be provided to the Center IT Security Manager. Any Contractor system(s) connected to a NASA network or operated by the Contractor for NASA may be subject to vulnerability assessment or penetration testing as part of the Center's IT security compliance assessment and the Contractor shall be required to assist in the completion of these activities.

(3) A decision to accept any residual risk shall be the responsibility of NASA. The Contractor shall notify the NASA system owner and the NASA data owner within 5 working days if new or unanticipated threats or hazards are discovered by the Contractor, made known to the Contractor, or if existing safeguards fail to function effectively. The Contractor shall make appropriate risk reduction recommendations to the NASA system owner and/or the NASA data owner and document the risk or modifications in the IT Security Plan.

(i) The Contractor shall develop a procedure to accomplish the recording and tracking of IT System Security Plans, including updates, and IT system penetration and vulnerability tests for all NASA systems under its control or for systems outsourced to them to be managed on behalf of NASA. The Contractor must report the results of these actions directly to the Center IT Security Manager.

(j) When directed by the Contracting Officer, the Contractor shall submit for NASA approval a post-award security implementation plan outlining how the Contractor intends to meet the requirements of NPG 2810.1. The plan shall subsequently be incorporated into the contract as a compliance document after receiving Government approval. The plan shall demonstrate thorough understanding of NPG 2810.1 and shall include as a minimum, the security measures and program safeguards to ensure that IT resources acquired and used by Contractor and subcontractor personnel --

(1) Are protected from unauthorized access, alteration, disclosure, or misuse of information processed, stored, or transmitted;

(2) Can maintain the continuity of automated information support for NASA missions, programs, and functions;

(3) Incorporate management, general, and application controls sufficient to provide cost-effective assurance of the systems' integrity and accuracy;

(4) Have appropriate technical, personnel, administrative, environmental, and access safeguards;

(5) Document and follow a virus protection program for all IT resources under its control; and

(6) Document and follow a network intrusion prevention program for all IT resources under its control.

(k) Prior to selecting any IT security solution, the Contractor shall consult with their Center IT Security Manager to ensure interoperability and compatibility with other systems with which there is a data or system interface requirement.

(l) The Contractor shall comply with all Federal and NASA encryption requirements for NASA flight programs (e.g., secure flight termination systems, encryption for satellite uplinks, encryption for flight and satellite command and control for both up and down link) and involve the Center Communications Security (COMSEC) Manager when selecting encryption solutions.

(m) The Contractor shall incorporate this clause in all subcontracts where the requirements identified in this clause are applicable to the performance of the subcontract.

End of Clause

52.252-70 COMPLIANCE WITH NASA FAR SUPPLEMENT (MAR 1989)

Any statements in this contract requiring compliance with specific provisions of the Federal Acquisition Regulation (e.g., Subpart 45.5) shall be construed to require compliance also with any corresponding implementing or supplementing provisions in the NASA FAR Supplement in effect on the date of this contract.

(End of clause)

SECTION J
LIST OF ATTACHMENTS

<u>Attachment</u>	<u>Title</u>
J-1	Statement of Work
J-2	Make-or-Buy Plan
J-3	Small Business and Small Disadvantaged Business Concerns – Subcontracting Plan
J-4	Government-Furnished Facilities, Property and Services
J-5	Delivery Schedule
J-6	Statement of Work for Space Shuttle System Integration Support
J-7	Printing and Duplicating Requirements of NASA Contracts and Grants
J-8	Award Fee Evaluation Plan
J-9	Post DD-250 Requirements for External Tanks Manufactured under Contract NAS8-33708 and Other Deferred Work, and Post DD-250 Activities
J-10	Provisioning Procedure for External Tank Spare Parts
J-11	External Tank Launch Support Services (KSC)
J-12	External Tank Flight Operations
J-13	Value Engineering
J-14	Energy Cost Reduction Program
J-15	Technology Utilization/Transfer Program
J-16	ASRM Support
J-17	Super Lightweight External Tank Non-Recurring Effort
J-18	Technical Performance Incentive Fee for Super Lightweight External Tank Non-Recurring Program
J-19	Procurement of Sixth Buy Flight Hardware
J-20	National Center for Advanced Manufacturing (NCAM)
J-21	Memorandum of Decision Under Public Law 85-804 (Indemnification)

ATTACHMENT J-1
STATEMENT OF WORK
EFFORT FOR EXTERNAL TANK PROJECT
ET-61 THROUGH ET-121:

1.0 SPACE SHUTTLE OBJECTIVES

1.1 The primary objective of the Space Shuttle Program is to provide an economic space transportation system that will support a wide range of scientific, defense and commercial applications in earth orbit.

1.2 The major elements of the Space Shuttle Program are the Orbiter, the Space Shuttle Main Engine (SSME), the Solid Rocket Booster (SRB) and the External Tank (ET).

2.0 REQUIREMENTS

This statement of work details the requirements for the production of Sixty External Tanks (ET-61 through ET-121). The statement of work is divided in subparts identified as follows:

2.1 Preproduction defines the requirements for the long-lead and preproduction activities leading to the production of ET-61 through ET-121 which must be met by the Space Shuttle External Tank (ET) Contractor in accomplishment of the Space Shuttle ET Project as follows:

2.1.1 The contractor under Contract NAS8-33708, Exhibit "O" procured Long-Lead Materials, issued purchase agreements to subcontractors and performed the related effort in support of purchasing and subcontract long-lead procurement actions for External Tanks ET-61 through ET-121. This effort is hereby transferred in its entirety from Contract NAS8-33708 and made an integral part of this contract.

2.1.2 The preproduction requirements encompass all efforts leading to the production of External Tanks ET-61 through ET-121 (except as specified herein to be furnished by the Government).

Preproduction is defined as follows:

1. Flight hardware material and subcontract for ET-61 through ET-121.
2. Freight directly associated with shipment of flight hardware to contractor.
3. Scrap and rework, consumables and expendables.

4. All labor, travel, other material, and miscellaneous Other Direct Cost (ODC)(through 12/31/88) or before the beginning of basic structure fabrication of ET Domes and Intertanks in accordance with the delivery requirements of Attachment J-5.

5. Material operations labor, travel, other material and miscellaneous Other Direct Costs.

6. Labor necessary to manage and report award fee performance.

2.2 Production. Defines the requirements for the manufacturing, assembly, test, checkout, and delivery of 60 operational flight articles in order to meet the delivery schedule established in Attachment J-5 of this contract. These requirements cover all effort, materials, tooling, equipment, hardware, facilities, services and management (except as specified to be provided by the Government) for the delivery of 60 External Tanks baselined as follows:

2.2.1 Thirty-four (34) External Tanks (ET-61 through ET-94) identified as Lightweight External Tanks (LWT) as baselined per MMC-ET-CM02 End Item Specification CPTO1M09A as of December 31, 1988 (through SCN 321, dated 11/4/93).

2.2.2 Twenty-six (26) External Tanks (ET-96 through ET-121) identified as Super Lightweight External Tanks (SLWT) as baselined by the addition of Appendix 40 to MMC-ET-CM02 End Item Specification CPTO1M09A. The nonrecurring portion of this effort for the Super Lightweight External Tank (SLWT) was incorporated into the Contract by Supplemental Agreement 321. The recurring effort was incorporated into the contract by Contract Modification 355.

2.3 The External Tank Work Breakdown Structure (WBS) submitted by Martin Marietta Corporation Letter 94MO-0654 and approved June 23, 1994, provides a product oriented relationship and organization of the various hardware, software, service, and other tasks elements associated with the External Tank Project.

2.4 This effort will include support common to preceding and succeeding contracts that will be allocated based on a mutually acceptable methodology established by the memorandum cost allocation dated April 1988 and revised December 1990 for allocation between NAS8-33708 and this contract. The acceptable methodology for allocation of direct support cost between this contract (5th Buy) and the succeeding contract (NAS8-00016 (6th Buy)) is provided in Section H, Clause H.30 of Contract NAS8-00016. This methodology was agreed during the negotiations of Contract NAS8-00016 as documented in the Confirmation of Negotiations letter (Lockheed Martin reference 00MO-0710) dated October 18, 2000. Adjustment to this methodology will occur only in the event of a government directed delivery date (DD-250 date) adjustment as contained in Attachment J-5 to this contract and Attachment J-7A of Contract NAS8-00016."

2.5 The contractor shall provide Post DD-250 External Tank storage and support activities based on the Baseline Manifest Model 92-1, Rev. 2 for the period of performance of this contract. Modifications of this Flight Manifest will be in accordance with the provisions of the "Changes" clause.

2.6 The contractor has been provided as Government-Furnished Property Tooling for a Production Rate of 24 External Tanks per year. These tools were procured under Contract NAS8-30300. The Contractor will deactivate all tooling in excess of a rate of 10 tanks per year.

2.7 The contractor shall provide for the Post DD-250 storage, spares, transportation services, special tooling/support equipment, and completion of Mod Kit Activities authorized prior to June 28, 1991 for External Tanks produced under Contract NAS8-33708. The Contractor shall accomplish the completion of Special Tooling as included in Attachment J-9. These activities will be in accordance with the terms and conditions of Attachment J-9, attached hereto, and are hereby made an integral part of this contract.

2.8 The contractor shall provide the effort to design, procure and store 5 additional shipsets of LWT hardware as defined by Contractor's proposal B02016-R1 dated July 18, 1997 and subsequently modified by Contractor's proposal B02024A dated January 20, 1999. Parts/hardware will be received and securely stored at MAF. The hardware shall be maintained to the procured design configuration.

2.9 The contractor shall achieve Year 2000 compliance as a performance metric in accordance with the following guidelines:

2.9.1 "Year 2000 compliant," as used herein, means that the information technology (hardware, software and firmware, including embedded systems or any other electro-mechanical or processor-based systems used in accordance with its associated documentation) accurately processes date and date-related data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations, to the extent that other information technology, used in combination with the information technology being acquired, properly exchanges date and date-related data with it.

2.9.2 Any information technology provided, operated and/or maintained under this contract must be Year 2000 compliant. To ensure this result, the Contractor shall provide documentation describing how the IT items or services demonstrate Year 2000 compliance, consisting of: (1) Company Developed Software - i.e. Product description; Functional Application; Software Language; Number of Lines of Code; If Compliant, Method of Validation; If not Compliant, Method of Correction and Validation; Date of Compliance; (2) Commercially Available Off the Shelf Software - i.e. Product Description; Functional Application; If Compliant, Vendor Certification of Y2K Compliance and Method of Validation; If not Compliant, Method of Correction and Validation; Date of Compliance; (3) Hardware - i.e. Description of Each Item (Product Manufacturer, Processor Type); Functional Application; If Compliant, Vendor Certification and Method of Validation; If not Compliant, Method of Correction and Validation; Date of Compliance.

2.9.3 Milestones for Renovation, Validation and Implementation: Any IT determined to be non-Year 2000 compliant shall be replaced, retired or repaired in accordance with the following schedule:

2.9.3.1 "Renovation" includes making and documenting software and hardware changes, developing replacement systems, and decommissioning systems to be retired. The Contractor must complete renovation of affected software, hardware and firmware by September 30, 1998.

2.9.3.2 "Validation" includes unit, integration, system, and end-to-end testing for Year 2000 compliance. The Contractor must complete validation and testing of converted or replaced systems by January 31, 1999.

2.9.3.3 "Implementation" includes acceptance testing and integration of converted and replaced systems into a production environment. The Contractor must complete implementation by March 31, 1999.

2.9.4 At a minimum, the Contractor shall provide documentation, including project plans and status reports, which demonstrate that the Contractor is meeting the milestones listed above.

2.10 The contractor shall procure one shipset of the common SLWT hardware and materials to support the potential substitution of an ALWT for an LWT.

2.11 The contractor shall perform ALWT design effort as scoped in engineering change proposal B02024A. This effort shall not include weld certifications or manufacturing process plans. Direction to implement the ALWT design change shall be the subject of separate contractual action.

2.12 The contractor shall weigh at the Michoud Assembly Facility, External Tanks ET-92 and ET-103 through ET-106 after DD250, and External Tanks ET-93, 94 and ET-107 through 121 prior to DD250.

2.13 The contractor shall be responsible for required material property testing as defined in PCP B81483-R1; Implementation of Friction Plug Weld Tests for pull process" with the exception of those tests to be performed by NASA as defined in Attachment J-4. **The requirements in this paragraph are hereby deleted in its entirety per SA 650.**

2.14 The contractor will design, fabricate and test 5 ET camera mod kits. Installation will require NASA's direction by separate contractual action.

3.0 INDEX OF COMPLIANCE SPECIFICATION, DOCUMENTS AND DEVIATIONS

The following documents, with the issue dates as listed, form a part of this Statement of Work. Documents as incorporated by reference throughout this Statement of Work shall be deemed to be the issue date and/or revision set forth in this index. The documents identified herein are listed for configuration or requirements identification purposes only. Hardware modifications to the items procured herein will be enabled pursuant to the clause of this contract entitled "Changes -- Cost Reimbursement -- Alternate V".

3.1 Specifications

<u>Document Number</u>	<u>Title and Date</u>
(CPTO1M09A) (Part I)	Prime Equipment Detail Specification, Part I of two parts, Performance Design and Verification Requirements, External Tank (LWT-1 and Subs)(CEI No. T01M09A) for Space Shuttle Program, dated April 9, 1980, through SCN 318 (August 31, 1993).
(CPTO1M09A) (Part II)	Prime Equipment Detail Specification, Part II of two parts, External Tank (CEI No. T01M09A) for Space Shuttle Program, dated May 3, 1983, through SCN 060 (September 1, 1993).

NOTE: Subsequent applicable Specification Change Notices (SCNs) shall be listed in the appropriate Specification Change Log, incorporated herein by reference.

3.2 Contractor Documents

<u>Document Number</u>	<u>Title and Date</u>
MMC-ET-CM01-B	External Tank Project, Configuration Management Plan, dated April 29, 1983, through DCN 059 dated August 4, 1993.
MMC-ET-MA73-1	Facilities Operating Plan, Revision B, Dated September 30, 1993.
MMC-ET-RA03-C	External Tank Project, Safety, Reliability and Quality Requirements and Implementation Document, dated January 24, 1980, through DCN 018 dated February 8, 1993.

<u>Document Number</u>	<u>Title and Date</u>
MMC-ET-RA05-E	Failure Modes Effects Analysis (FMEA) Procedure, dated September 15, 1993.
MMC-RA12-B	Contamination Control Plan, dated May, 1986, through DCN 019.
MMC-ET-SE13-D	Space Shuttle External Tank, Fracture Control Requirements and Implementation Document, dated March 15, 1993.
MMC-ET-SE16-E	External Tank Project Material and Processes Plan, dated August 1, 1991 through DCN 001 dated August 31, 1992.
MMC-ET-SE16(A-1)-K	Approved Material List, Addendum 1 to Materials and Processes Control Plan, dated August 1, 1991 through DCN 001 dated July 31, 1992.
MMC-ET-SE16(A-2)-L	Approved Processes List, Addendum 2 to Materials and Processes Control Plan, dated August 1, 1991 through DCN 001 dated July 31, 1992.
MMC-ET-SE42-C	Long Term Storage Requirements, dated April 4, 1988 through DCN 009 dated February 5, 1993.
MMC-ET-TM01-1-C	External Tank Verification Plan, dated June 22, 1988 through DCN 040 dated July 14, 1993.
MMC-ET-TM04k-B	External Tank Acceptance Requirements, dated September 7, 1982, through DCN 007 dated October 30, 1989.

NOTE: Subsequent applicable Specification Change Notices (SCNs) shall be listed in the appropriate Specification Change Log, incorporated herein by reference.

3.3 Interface Control Documents

The applicable ICDs are set forth in the ET End Item Specification. The ICD revision, revision date, and the applicable Interface Revision Notices (IRNs) shall be listed in the latest issue of the "External Tank Interface Control Documentation Contractual

Index and Status Report", CM-017-015-2H. Applicable Preliminary Interface Revision Notices (PIRNS) will be implemented as directed by the Contracting Officer's Technical Representative.

3.4 Requirements Documents

<u>Document Number</u>	<u>Title and Date</u>
CM-017-015-2H	External Tank Interface Control Documentation Contractual Index and Status Report (Latest Issue).
CM-017-019-2H	External Tank Configuration Identification Index and Modification Status Report (Latest Issue).
DPD 660	Information Requirements Document Production - incremental III dated March 31, 1989.
JSC 10780	Space Transportation System Flight Requirements Rev. D. Change 1 Document Space Shuttle Orbital Flight Test (STS-1); dated May 4, 1980.
KMI 3452.1	KSC Contractors' Integrated Suggestion System.
MMI-8610.2	MSFC Space Transportation System Personnel Reliability Program.
NHB 1440.4	Specifications and Standards for NASA Engineering Data Micro Reproduction Systems.
NMI 8621.1	Mishaps Reporting and Investigations
MMI 1711.2E	Mishaps Reporting and Investigations
NHB 6000.1	Requirements for Packaging, Handling and Transportation for Aeronautical and Space Shuttle Equipment and Associated Components.
NHB 5300.4 (1D-2)	Safety, Reliability, Maintainability and Quality Provisions for the Space Shuttle Program dated October 1979.
NSTS 07700	Space Shuttle Flight and Ground System Vol. X Specification

<u>Document Number</u>	<u>Title and Date</u>
NSTS 07700	Space Shuttle Integrated Logistics Requirements, Vol. XII.
NSTS 08171	Operations and Maintenance Requirements and Specifications Documents.
NSTS 16007	Launch Commit Criteria and Background Document, Appendix F.
UNNUMBERED	Operational Space Shuttle Evaluation Plan dated January 16, 1984.

4.0 PROJECT MANAGEMENT (WBS 3.6.1)

Operate and maintain those management activities for the planning, organizing, coordinating, authorizing and controlling the External Tank Project, required to accomplish project objectives. these activities include: Performance Management, Contract Administration, Configuration Management, Information Management, Manufacturing Management, Government-Furnished Property Management, Procurement Management, Engineering Management, and Safety, Reliability and Quality Assurance Management.

4.1 Performance Management and Contract Administration (WBS 3.6.1.1)

4.1.1 Provide a cost management system which includes accountability to work breakdown structure.

4.1.2 Consolidate program requirements and prepare and maintain the master and detailed project schedules. Identify program performance measurement criteria, analyze and summarize measurement data, and identify problems, recommend solutions, and track problem resolutions.

4.1.3 Perform contract administration functions associated with the ET Project.

4.1.4 Administer computer hardware and software programs oriented to the Project Management System, Configuration Control, and Production Systems and provide Computer Services support to the scientific system.

4.1.5 Provide the integrated planning, scheduling, budgeting, work authorization, and cost accumulation activities required to maintain the cost management systems for the tasks identified in this Statement of Work. Also maintain standard procedures manuals, conduct systems audits, provide motivation programs, provide scientific programs, computer services support, and

provide for administration of manpower. Provide support to interface with, operate and maintain the data system for functional cost management of labor cost.

4.2 Configuration Management (WBS 3.6.1.2)

4.2.1 Operate a Configuration Management System in accordance with the NASA Approved Configuration Management plan, MMC-ET-CM01, providing for both programmatic and configuration change control.

4.2.2 Provide that configuration management support required to maintain the ET design and performance requirements baseline and the associated safety, reliability, quality assurance, production engineering, process planning and tooling documentation which represents the production requirements baseline for the ET-61 and subsequent effectivities.

4.2.3 Maintain the baseline by evaluating proposed changes for ET-61 and subsequent effectivities impact and preparing and processing those change proposals necessary to document this impact for subsequent Government disposition.

4.3 Information Management (WBS 3.6.1.3)

4.3.1 Furnish information in accordance with the requirements of the Data Procurement Document DPD 660. Provide the overall management process and activities required to assure proper information control, compatibility, availability and currency; identify, control, monitor the preparation of, reproduce, distribute and maintain status of the internal and deliverable documentation for the External Tank Project; maintain a data management plan and procedures. Acquire and control data from Governmental agencies; subcontractors, and suppliers.

4.3.2 Operate a Management Information Center and maintain a project-level information file.

4.4 Manufacturing Management (WBS 3.6.1.4)

4.4.1 Provide manufacturing management activities for support of the planning, scheduling, build documentation, preparation and assembly and checkout of the ET and associated support equipment as follows:

4.4.1.1 Provide planning documentation necessary to support component installation, assembly and checkout.

4.4.1.2 Operate a production control program to determine production hardware status and availability of components to support operational schedules.

4.4.1.3 Integrate tooling, rigging and crane operations, and factory support to assure proper interface with material and assembly flow plans.

4.4.1.4 Provide support for the Transportation and Handling Control Plan, and the Production Control Plan, and interface with the As Built Hardware Reporting and the Tool Configuration Management Systems.

4.4.1.5 Implement work requirements, detail shop work orders and schedules, maintain tool cribs and stock rooms, expedite production hardware and maintain production status in support of total production operations and tests.

4.5 Government Property Management (WBS 3.6.1.5)

4.5.1 Identify, schedule, status, receive inspect, checkout, store and/or account for the Government-Provided Property set forth in Attachment J-4.

4.6 Procurement Management (WBS 3.6.1.6)

4.6.1 Provide a Procurement Management System to Integrate technical, business and management function into a disciplined audible procurement activity. It shall provide an integrated procurement system to direct and control intra and interdivisional work, subcontractors and suppliers; authorize subcontractor tooling and equipment; analyze subcontractor performance, progress, and document and provide corrective action as required; conduct subcontractor and suppliers reviews; implement test and inspection support for the Critical Items List/Pre-flight Assessment Review; and provide for onsite coordination and evaluation for procurements. Maintain records and submit required reports relating to the geographic dispersion of Small and Small Disadvantaged Business participation in External Tank Project Procurements and subcontractors. The "Make-or-Buy" requirements are set forth in Attachment J-2.

4.7 Production Engineering and Hardware Certification (WBS 3.6.1.7)

4.7.1 Technical Operations

The Contractor shall provide engineering liaison to Production Operations along with Quality and Procurement, as required, to support External Tank Production and assure proper interpretation of drawings and MPPs. Hardware Acceptance Reviews will be supported inclusive of acceptance test requirement maintenance. Review and disposition of Non-Conformance Documents (NCDs) and liaison calls will be accomplished complete with Senior Material Review (SMR) participation and non-conformance corrective action analysis and trending. The contractor will provide database development/maintenance for production materials and processing anomalies, development/maintenance of fingerprint database of External Tank flight materials, and identification, screening, and recommendation of potential candidates of new Thermal Protection System constituent materials and insulation systems to mitigate risk of material or vendor obsolescence issues.

4.7.1.1 Launch Readiness Support

The Contractor shall furnish the necessary engineering skills, labor, materials and equipment (except that specified to be provided by the Government) to provide the capability to support External Tank Launch Readiness Assessment, Flight Certification and Shuttle Processing at the launch site. These

activities shall include the monitoring and reporting of ET activities at KSC, defining processing requirements for Mod Kits to resolve ET problems or to implement design changes. In addition, the contractor will review and coordinate training and certification requirements for SPC critical skills; and review, prepare and/or coordinate changes to NSTS 08171, Files I, II, IV OMRSD and NSTS 16007 LCCD.

Provide Flight Readiness Reviews (FRR), and Launch Support to KSC and concurrence of Launch Site Material Review Board (MRB). The Contractor will provide Action Requests (AR) for problem/concern resolution on the ET and provide Mission Management Team Membership for real time launch activities.

The Contractor will support MSFC Main Propulsion System (MPS) assessments for flight and test preparations by providing predicted ET/Shuttle Propulsion System performance and capabilities; Mass Properties; and propellant inventories for each flight and test. Performance predictions shall be based on Government Furnished data. Performance predictions shall be submitted to the ET Project Office in accordance with the established memorandum format.

4.7.1.2 Logistics Support to KSC and MSFC

The Contractor shall provide Logistics support in accordance with the applicable requirements of NSTS 07700, Volume XII as implemented by ET Project Operational Logistics Implementation Document, MMC-ET-LS02 (latest DCN/Rev.). This includes support to the MSFC ET Project Office and the Systems Logistics Manager in: providing Supportability Trend Analysis and Reporting System (STARS) data and status, providing required support to the ET Project Office for activities of the SSP Integrated Logistics Panel and associated sub-panels, coordinating the Mission Support Room activities with off site groups (LSS, SPC and MSFC) in identifying Logistics requirements to resolve technical problems.

Provide Logistics Analysis to determine spares, expendable/consumable materials and maintenance requirements for the ET related Support Equipment (SE) and the Ground Umbilical Carrier Assembly (GUCA). Prepare, Coordinate, and release Time Compliance Technical Instructions (TCTIs) for Modification Kits. Prepare Operational Maintenance Documentation (OMD) required to provide logistics support and maintenance requirements; Recommended Spare Parts List (RSPL), Work Unit Code (WUC) Manual, Critical Line Replaceable Unit (LRU) list, Special Consideration Items Drawing (SCID) and Operations and maintenance (O&M) Manuals for Support Equipment and the GUCA. Provide the required supply actions for non-provisioned LRUs and replenishment of provisioned LRUs and expendable/consumable materials at KSC.

Establish and maintain controls to ensure that the integrity of LRU off-line maintenance certification at the launch site and vendors has not been invalidated as a result of activity, or when key elements of certification, i.e., facilities process/procedures or personnel have been changed. Maintain, track and status time/age/cycle data for components on complete end items and operational logistics spares.

4.7.1.3 Engineering Reliability Support

The Contractor shall provide Engineering Reliability support in accordance with the applicable requirements of NHB5300.4 (ID-2) as implemented by ET Project Safety, Reliability and Quality Requirements and Implementation Document, MMC-ET-RA03 (latest DCN/Rev.). This effort encompasses the following tasks:

Support ET design, delivery and operational use with reliability analyses, trade studies, statistical analyses and failure rate determinations. Review and impact as necessary safety, certification, failure/anomaly documentation and changes to operational activities to ensure compliance with reliability requirements and incorporation into reliability documentation and/or waiver processes. The contractor will support and maintain Government Industry Data Exchange Program (GIDEP) Engineering, Reliability, Maintainability and Metrology Data Interchanges.

4.7.1.4 Flight Evaluation for ET Hardware Certification

The Contractor shall provide and maintain Engineering technical capability and the flight database to support flight performance assessments which affect the ET Hardware Certification for Flight. Evaluation of any flight anomalies or problems, as defined in Paragraph 7.3 of the Operational Space shuttle Evaluation Plan and reported by the Flight Evaluation Working Group, will be performed to assess the impact on the ET to future flights.

4.7.1.5 Interface Definition Requirements

Maintain the External Tank Interface Definition requirements and prepare/review/process new interface design changes. Participate in the Space Shuttle Program Office ICD Change Board and the Space Shuttle Program Office Interface Working Group activities. The ET interface design and performance requirements are defined/controlled by the documents listed in this Attachment, Paragraph 3.0 - "Index of Compliance, Specification Documents and Deviations."

4.7.1.6 Generic Environments/System Analysis Support

The Contractor shall provide analytical support in response to MSFC requests to assess generic environments for the ET design. The Contractor shall provide technical expertise to support Space Shuttle Program Panels and Working Groups in the performance of system related analyses, investigations and actions as related to External Tank loads, trajectories, venting, aerodynamics, thermal loads, debris, range safety, etc. The Contractor shall notify MSFC when any panel or Space Shuttle Program Office supported issues impact the External Tank design.

4.7.1.7 Space Shuttle Program Requirements and Quick Looks

The Contractor shall perform technical reviews of all changes proposed by the Space Shuttle Program requirements as baselined or changed by the Space Shuttle Program Requirements Control Board Directive (PRCBD), proposed by Change Request (CR) and those ET Project requirements which implement same. The traceability to NSTS 07700, Volume X shall be maintained in a cross reference matrix in the ET End Item Specification.

In accordance with the requirements of paragraph 6.4 of the NASA approved Configuration Management Plan, MMC-ET-CM01-B, the Contractor shall identify changes that would impact ET design and/or contractual requirements documentation and provide the Contractor's recommended disposition of the change. This shall include the providing of the "Quick Look" capability for impact assessment of Space Shuttle Program or Level III change data as requested by the ET Project.

Additionally, the Contractor will provide support at MAF for ET Project Configuration Control Board (CCB), ICB and Space Shuttle Program Office PRCB review and disposition of changes. Presentation material and supporting data for these review boards shall be provided by the Contractor as required. Engineering support will be provided for NASA/MSFC preparation of ET Critical Items List (CIL) waivers to be incorporated in Volume X of NSTS-07700. The Contractor will review the DOLILU and DOLILU II processes and related changes in order to identify ET impacts and provide the recommended dispositions.

4.7.1.8 Propulsion Systems Integration Group (PSIG)

The Contractor shall provide Engineering technical expertise to support the PSIG in the performance of propulsion-related analyses and investigations; assessing proposed Shuttle changes for Main Propulsion System (MPS) performance or operations impacts to ET; pre-coordination of proposed or potential ET changes, hardware tolerances, and deviations which may impact Shuttle MPS performance or operations; evaluating and coordinating ET data and performance with other MPS elements; and in supporting PSIG directed meetings and designated sub-panels.

4.7.1.9 Stress Analysis Database Maintenance

The Contractor shall maintain the Stress Analysis database to reflect changes. Requirement updates that are baselined on the ET Project will be assessed to determine if their incorporation is part of this maintenance task or constitutes a new basic analysis task.

4.7.1.10 Senior Management Review (SMR)

The Contractor shall operate a Senior Management Review to evaluate significant Material dispositions. The following selection criteria applies for significant Material disposition: (a) unique one-of-a-kind repairs; and (b) use-as-is and repair dispositions that are considered outside of the ET Contractor's "current database".

4.7.2 MSFC Operations Management

4.7.2.1 MSFC Research & Development Center Initiatives

MSFC Research and Development Center WBS 3.6.2.9 - The Contractor shall provide the necessary skills, materials, studies, technical expertise, documentation assistance, and equipment (except that to be furnished by the Government) to perform on-site support/coordination for MSFC initiatives in the areas of propulsion, science research materials, avionics, space environment, and payload utilization. Inclusive in this support will be refinement of material processing tasks and related equipment (e.g. non-metals, welding, and metallurgy, TPS spray/molding, and automated applications of insulation), skills to perform upgrades, maintenance, fabrications of assigned ET related fixtures and equipment, unique technical ADP functions, quality and safety surveillance, NDE, hardware analyses/assessments, property control and logistics for contractor activities.

4.7.2.2 On-Site Program Requirements Compliance

The Contractor will provide an onsite capability at the MSFC facility to assure continued compliance with production program requirements and regulations associated with the operations and maintenance of the ET Project Program functions related to hardware certification and verification.

a. As part of the continuing hardware development and production activity, provide unique hardware analysis/assessment in response to MAF and/or Program requests, provide evaluation, coordination, preparation, presentation, and distribution of Change Evaluations, Change Requests, Configuration Control Board Directives, Hardware Certification revisions, OMRS Requirements Change Notices, LCC Launch Change Notices, Material Review/Interface Working Group Reviews inclusive of Interface Requirement Notices, Space Shuttle Program Requirements boards inclusive of Program Requirements, Control Board Directives, and ET Configuration Control Board Agenda and Minutes.

b. Prepare, coordinate and distribute Project Technical Directives, Critical Requirements Tasks, Special Development Studies and disposition documentation. Provide liaison between on-site Contractor and NASA Personnel.

4.7.2.3 ET Project ADP Support at MSFC

The Contractor will provide ADP functions in the business application areas pertaining to the External Tank Project continuing hardware development and production activity. MIS tasks will include, but are not limited to software development, ADP hardware and software acquisition, installation, and maintenance in the areas of operating systems, databases, Local Area Networks, application software, materials development, manufacturing processes, and liaison for ADPE Local Area Network connections. All related ancillary functions will be performed in the areas of facilities, telecommunications, Local Area Networks, procurement issues, various hardware analyses and unique hardware request/special studies.

4.8 Safety, Reliability and Quality Assurance Management (WBS 3.6.1.8)

4.8.1 Operate a system to assure that the ET requirements are met in the production, test and delivery of the ET in accordance with the "Quality Reliability and Safety Requirements and Implementation Document", MMC-ET-RA03 which implements NHB 5300.4 (1D-2) as set forth therein.

4.8.1.1 When problems are identified by the Space Shuttle Problem Reporting Systems in particular materials, components or hardware that make it necessary to apply more stringent inspection/test requirements than currently identified in the Product Assurance Plans (PAPs), Receiving Acceptance Plan (RAPs), or any other internal Contractor directives, which support the "Quality, Reliability and Safety Requirements and Implementation Document", identified in paragraph 4.8.1 above, the specific inspection/test requirements shall be included in the appropriate document.

4.8.2 The system shall provide for motivational, safety, reliability and quality assurance activities to assure that provisions are made to provide acceptable hardware through systematic procedures, training, analysis, review and assessment. The system shall also provide safety, reliability and quality assurance requirements and activities for all subcontract and supplier hardware.

4.8.3 Review incoming ALERTS for impact to the ET and coordinate, status and maintain ALERTS requiring action. Initiate ALERTS for conditions found on the ET Project which may affect other Contractors.

4.8.4 Periodically review supplier facilities and documentation for compliance with provisions of NHB 5300.4 (1D-2) with respect to supplier ability to furnish parts and equipment for the ET.

4.8.5 Investigate all accidents/incidents and personnel injuries to determine cause and recommend corrective action to prevent recurrence. Includes statistical analysis and records on frequency and severity rates and submittal of reports (MMC-ET-RA02) to NASA.

4.8.6 Provide support and input data as required to interface with the Non-Conformance Reporting Data System after system is fully implemented.

4.8.7 perform the recertification of High Pressure Vessels/Systems in accordance with (DR) RA25 to DPD 660.

4.9 Project Engineering and Integration (WBS 3.6.2)

Support Shuttle Systems level analyses, trade studies, test and development activities. Perform studies, test and analyses; develop requirements, plans and procedures, and provide for the direction, control and implementation of the External Tank design and integration as follows:

4.9.1 Shuttle System Supporting Analyses and Integration (WBS 3.6.2.1)

4.9.1.1 Perform analyses, studies, evaluations and tests to support Shuttle System Performance, design and programmatic requirements, development and verification of design solutions, coordination of Interface Control Documents (ICDs); evaluation and establishment of Shuttle integrated test, prelaunch flight and mission operation procedures; analyses of ET separation, entry and disposal. Provide support for Level I and II change Directive evaluations and coordination, including cost and schedule impact. This work shall be accomplished in accordance with clause G.2 and Attachment J-6.

4.9.1.2 Perform analyses, studies, evaluation, tests and the nonrecurring effort for the implementation of authorized producibility candidates that may reduce the estimated cost and unit cost for production of the External Tank. This work shall be accomplished in accordance with Schedule clause G.2 and Attachment J-6.

4.9.2 Flight Support (WBS 3.6.2.2)

The Contractor shall perform tasks in support of the External Tank Flight Support as identified in Attachment J-12 of this contract beginning January 1, 1989. Any extraordinary support resulting from major anomalies or changes in mission model will be the subject of separate contractual action.

a. Unless noted otherwise, reporting or documentation generation functions performed as part of the Flight Support activities are provided to support actual flight schedules based on direction of the Contracting Officer's Technical Representative and are not identified as deliverable documentation within the context of Attachment J-1, Section 4.3.

b. The contractor shall provide technical expertise required to perform analyses, trade studies, and evaluations/assessments to support Space Shuttle flight operations. Special tests, hardware design/development, hardware modeling, or new computer software/program acquisition or development will be performed in accordance with Attachment J-6 of this contract entitled

"Statement of Work for Space Shuttle System Integration Support" as directed by NASA/MSFC Pursuant to clause G.2 entitled "Technical Direction and Surveillance".

c. Provide mass properties accounting information and actual weight information for each External Tank in accordance with DR SE02.

4.9.3 External Tank Production Technology Tasks (WBS 3.6.2.3)

(Note: The effort identified in this 4.9.3. section was deactivated effective October 1, 1993.)

The Contractor shall perform Production Technology Tasks for development of improved manufacturing processes and materials used in the production of the External Tank. Effort may include, but is not limited to, weld development, test development, performance analysis, flight environmental criteria, and problem investigation associated with ET Production and operational processes. Tasks to be performed in scope to this section will be authorized by the Contracting Officer's Technical Representative pursuant to Clause G-2 herein. Production Technology Tasks will be accomplished under one of the following ET program thrusts:

4.9.3.1 Manufacturing/Production Processes

The Contractor will conduct studies and analysis of processes which can be applied to enhance the ET Manufacturing/Production Processes. The objective of these enhanced processes is to provide a high quality product at a minimum cost. These Production Technology Tasks can include, but are not limited to, VPPA Welding, Fact Analyzer Software Simulator, etc.

4.9.3.2 Product Assurance Processes

The Contractor will develop and analyze Inspection Processes used in the Manufacturing of the ET. The objective will be for development and implementation of processes/systems to assure that materials and techniques used in ET Manufacturing meet or exceed specifications and requirements. These Production Technology Tasks can include, but are not limited to, Fingerprint and Signature Identification, TPS Process Fingerprinting, Instrumental Characterization of TPS Materials, and Micro-Analytical and Surface Science Techniques, etc.

4.9.3.3 Advanced Technology Applications

The Contractor will perform investigative studies of Advanced Technology Methods which have potential application in the ET Program. The objective of this area is to

develop the usage of Composite Applications, and Surface Analysis on the ET project. These Production Technology Tasks can include, but are not limited to, Analysis of Cleaned and Primed Surfaces, and Composite Applications on the ET, etc.

4.9.3.4 Assured Deliverability

The Contractor shall perform tasks which will provide for back-up materials or sources for key ET elements. The objective is to develop alternate sources for critical chemicals/items required in the manufacturing of the ET. These Production Technology tasks can include, but are not limited to, In-house Development of an Enhanced TPS System, Alternate Foams, and Ancillary Foam Investigation, etc.

NOTE: Paragraph 4.9.3 period of performance begins April 25, 1991.

4.9.4 External Tank Launch Support Services (KSC) (WBS 3.6.2.4)

The Contractor will support the Government and the Shuttle Processing Contractor (SPC) with launch site expertise on ET design and processing requirements. The Contractor will also provide or coordinate support in the areas of processing operations, anomaly resolution, Configuration Management, Safety, Reliability and Quality Assurance and Modifications with regard to the ET and associated support equipment hardware/software, interfacing, training and certification as defined in Attachment J-11 attached hereto and hereby made an integral part of this contract.

NOTE: Paragraph 4.9.4. period of performance begins April 25, 1991.

4.9.4.1 Bar Coding at KSC

Beginning January 1, 1993, the Contractor will implement bar coding of logistics spares, ship loose hardware, mod-kit hardware, and consumable materials shipped to KSC.

4.9.5 External Tank Critical Requirements Activities

This Activity was deactivated in its entirety as of October 15, 2001 per Mod 622

The External Tank Critical Requirements Activities are designed to provide Contractor support to the External Tank Project and Space Shuttle Program. Data Requirement Document MMC-ET-SE58, "External Tank Critical Requirements Activities" approved in accordance with the requirements of DPD #660, Information Requirements Document Production - Increment III, defines specific scope of work and the technical approach and workscope phasing for compliance with the following requirements. This effort does not include implementation and validation. By mutual agreement, workscopes identified below may be substituted by other workscopes with complementary deletions and or reductions.

4.9.5.1 Blowing Agents

Perform identification, characterization, and verification of environmentally compliant foam blowing agents for External Tank applications which support the Montreal Protocol Act for elimination of ozone depleting agents through the use of HCFC-141b as a blowing agent by 1996 and the eventual elimination of HCFC-141b. The HCFC-141b efforts include formulation, optimization and replacement, process definition testing and design verification test article preparation and testing. Foam insulation components will also be identified, optimized and characterized for replacement of HCFC-141b blowing agent.

4.9.5.2 Instrumental Characterization of TPS Materials

Develop methods and databases for the instrumental characterization of TPS materials, which include updating databases for TPS foams containing HCFC-141b blowing agent. Evaluate methods for determination of A to B ratio in processed foam insulation PDL-4034. Develop fingerprint methods for alternate materials and RTV silicones, for Conathane adhesive replacement materials, and for third-generation TPS foam insulation.

4.9.5.3 Alternate SOFI Adhesive Development

Perform identification, screening, characterization, and development activities for a foam replacement closeout adhesive, including test verification.

4.9.5.4 Environmental Alternatives for Primers and Solvents

Perform identification, development and verification of replacement primers, primer application methods and low volatile organic compounds (VOC) solvents to comply with environmental issues, including replacements for chromates and MEK.

4.9.5.5 CFC and Dichloromethane Solvents Replacement

Perform identification, development and verification of cleaning solvent replacements for the CFC and dichloromethane solvents to satisfy environmental compliance issues.

4.9.5.6 Evaluation of Environmentally Compliant Materials and Processes

Perform identification, evaluation and verification of cleaners and solvent recovery methods necessary to support the elimination/minimization of TCE usage in cleaning

operations at MAF. In addition, develop methods for sampling and analysis of chromate emissions at MAF.

4.9.5.7 Alternate Foams

Perform identification, development and silicone binder system and foam insulation with HCFC-141b used for ET acreage application and component closeout.

4.9.5.8 Weld Integrity

Investigate, study, test and verify welding processes, tooling, equipment and automation techniques. (Completed 9/30/98)

5.0 EXTERNAL TANK STAGE (WBS 3.6.3)

5.1 Provide the materials and effort for the procurement or manufacture, quality control, assembly, installation, checkout and acceptance of flight hardware for the following subsystems to satisfy the requirements stated above.

5.1.1 Structures

Provide materials and effort necessary for the production and in-process test of the structures subsystems in accordance with the requirements for flight hardware.

5.1.2 Propulsion and Mechanical Subsystem

Provide materials and effort necessary for the production and in-process test of the propulsion and mechanical subsystem in accordance with the requirements for flight hardware.

5.1.3 Electrical/Instrumentation Subsystem

Provide materials and effort necessary for the production and in-process test of the electrical/instrumentation subsystem in accordance with the requirements for flight hardware.

5.1.4 Final Installation, Assembly and Checkout

Provide material and effort necessary for the final installation, assembly, checkout and acceptance of flight hardware and instrumentation in accordance with the requirements set forth in the ET End Item Specification.

5.1.5 Thermal Protection System

Provide materials and effort for the application of the Thermal Protection System in accordance with the requirements for flight hardware.

6.0 EXTERNAL TANK SYSTEM SUPPORT (WBS 3.6.5)

6.1 Special Tooling and Support Equipment (WBS 3.6.5.2)

6.1.1 The Contractor shall provide the services and materials to maintain that special tooling required to assembly ET parts, subassemblies and assemblies, which includes all jigs, dies, fixtures, molds, patterns, taps, gauges, other equipment and manufacturing aids, and replacement thereof, which are of such a specialized nature that, without substantial modification or alteration, their use is limited to the production of particular parts.

6.1.2 The Contractor shall provide the services and materials to maintain Special Test Equipment (STE), which is that equipment and associated software required to support Manufacturing site checkout of the ET, its subassemblies, or other ET system elements during manufacturing buildup.

6.1.3 The Contractor shall provide the services and materials to maintain the Rotational Support Equipment (RSE), Contingency Equipment (CE) and Ground Support Equipment (GSE), which is that equipment and associated software required to transport, handle, and maintain the ET, its subassemblies, or other ET system elements within the manufacturing facility, at other Government facilities authorized in this contract, and to and from the launch site.

6.2 Facilities and Maintenance (WBS 3.6.4)

Facility maintenance responsibilities are as set forth in MAF Directive (MD) 8831.1 dated March 28, 1984, for those items of real property, buildings, and other structures and facilities identified in Real Property Summary dated December 31, 1988.

The Contractor shall perform the following for the operation and maintenance of the Michoud Assembly Facility (MAF) to accommodate the fabrication and assembly of the External Tank in accordance with the project schedules and delivery requirements and as required to administer and manage Contract NAS8-30382(F), NAS8-36747(F) and NAS8-39243(F). This responsibility includes the performance of those production support activities which are required for the continued operation of the MAF at a basic level of efficiency, safety, and sanitation except for normal deterioration expected for fair wear and tear. Facilities Operating Plan, MMC-ET-MA73-1, defining the services to be performed by the Contractor is included in this contract by reference and is subject to all its terms and conditions.

6.2.1 General Planning and Administrative support including MAF Long Range Planning, Construction of Facilities

Planning, Operational and Resource Planning, Office Management, Reproduction Management, Environment Management, Energy Management, Energy Management, and Administrative Services.

6.2.1.1 Environmental Management

- a. The Contractor shall comply with Environmental Laws and regulations as baselined in the document "NASA/Martin Marietta Corporation Responsibilities for Environmental Laws Compliance" Document Number MMC-ET-MA89.
- b. The Contractor shall identify to NASA any facility modifications or projects required to comply with new or changed environmental requirements and the contract shall be modified and equitably adjusted to incorporate such facility modifications and/or projects. In the event that projects associated with environmental laws and regulations are not authorized, costs resulting from non-compliance shall be allocable and allowable and/or non-compliant operations may be discontinued after notification to NASA until satisfactory resolution of the non-compliant condition.
- c. Compliance with newly promulgated laws and regulations will be the subject of an equitable adjustment to this contract.
- d. Clean up activities, including that required to correct previously existing conditions, will be performed by separate contractual action under Contract NAS8-39243(F) or its successor. Activities prior to January 1, 1993 will continue to be performed as definitized.

6.2.2 Engineering, Administration, and Supervision in support of acquiring new plant equipment. Includes development of equipment requirements and specifications, obtaining and evaluating vendor quotes, supervision of equipment and performance checkout, preparation of maintenance requirements and equipment management.

6.2.2.1 Specific equipment acquisition by the Contractor and the provisions for their installation as required to support production will be authorized by separate contractual action pursuant to Attachment J-1 of Contract NAS8-39243(F), or its successor.

6.2.3 Engineering, Administration, and Supervision in support of the rehabilitation, rearrangement/alteration of capital equipment and real property/systems, based on maintenance records, capability, age and condition. Includes development of equipment/facilities requirements, specifications and design criteria, vendor/subcontractor selection, rearrangements and alteration design, project management, preparation of work authorization, schedules, and project performance and status.

6.2.3.1 Specific equipment rehabilitation projects required to support production will be authorized by separate contractual action pursuant to Contract NAS8-36243(F), attachment J-2 or its successor.

6.2.4 Project Management and Engineering support for the construction, modification and upgrade of facilities, including planning, budgeting and scheduling, identification of detail plant layout and feasibility studies, developing design criteria for NASA approved projects, selection and management of A&E design, 30%, 60% and 90%, and final design reviews and analysis of as built conditions.

6.2.4.1 Specific facilities modification and construction projects required to support production will be authorized by separate contractual action pursuant to Contract NAS8-39243(F), Attachment J-3 or its successor.

6.2.4.2 Provide services and supplies for the maintenance of real property facilities in accordance with the Maintenance Plan contained in the Facilities Operating Plan (MMC-ET-MA73-1).

6.2.5 Facilities maintenance and operations support, including Engineering, Administration, Supervision and Craft Labor for performing preventive/corrective maintenance of property/equipment and for operation of plant systems in accordance with the Maintenance Plan contained in the Facilities Operating Plan (MMC-ET-MA73-1).

Provide a critical production systems operation program on selected production systems to assure a constant state of production readiness by performing the following functions with regard to MAF Facilities:

6.2.5.1 Functionally checkout systems and procedures.

6.2.5.2 Evaluate systems operating procedures.

6.2.5.3 Administration of configuration control process.

6.2.5.4 Check and maintain configuration control drawings.

6.2.5.5 Check calibration performance verification, operations of support systems.

6.2.5.6 Instrument calibration, malfunction analysis, improvement modification and functional checkouts.

6.3 Support Services (WBS 3.6.5)

6.3.1 Provide the services and materials for the support of the ET MAF production activities, and flight program as defined below. These services shall be provided in accordance with Paragraph 4.7, Engineering Management, of this Statement of Work.

6.3.2 Provide services and materials required to conduct training for the ET Project. Training services include course development, preparation of training aids and materials, and presentation of training courses at MAF to ET Contractor personnel involved in the fabrication, testing, operation, transportation, and maintenance of project hardware and equipment during MAF production and transportation of flight hardware. Provide the certification and maintenance of required proficiency levels for ET Contractor personnel involved in the fabrication, testing, operation, transportation and maintenance of project hardware and equipment during MAF production and transportation of flight hardware.

6.3.3 Spares for support of the Flight Program shall be provisioned by NASA in accordance with Attachment J-10, "Provisioning Procedures for External Tank Spare Parts."

6.3.4 Factory modifications and modification kits for field installation in support of delivered hardware shall be provided by the Contractor as required by separate contractual action.

6.3.5 Transportation services required to transport the External Tank, its major subassemblies and STE/TSE from the point of final assembly to the point of barge embarkation and loading to include that effort required to load, tie down and secure the hardware/gear/equipment/material on marine vessels. Barges will be ballasted for sea by the Contractor's personnel. External Tank Barge shipment will be unmanned effective May 28, 1992.

7.0 INCORPORATION OF PROJECT AND ENGINEERING CHANGE PROPOSALS (PCP/ECP'S)

7.1 The Contractor shall submit in writing Engineering Change Proposals (ECPs) and Project Change Proposals (PCPs) in accordance with MMC-ET-CM01, External Tank Project Configuration Management Plan.

7.2 The Contractor shall implement MSFC approved Project Change Proposals and Engineering Change Proposals in accordance with the clause of this contract entitled, "Changes -- Cost Reimbursement -- Alternate V". PCPs/ECPs approved for performance by the Contractor shall be deemed definitized as listed in the latest issue of the "External Tank Configuration Identification Index and Modification Status Report", CM-017-19-2H, incorporated herein by reference.

8.0 ASRM SUPPORT

The Contractor shall provide the non-recurring effort to support the ASRM program at Michoud Assembly Facility in accordance with the terms and conditions of this contract, the work scope identified in Attachment J-16 of this contract and Attachments J-1-A, J-3-A and J-6 of Contract NAS8-36747(F). Any items not specifically identified in Attachment J-16 will be subject to separate contract adjustment in accordance with the FAR Clause 52.243.2 Changes - Cost Reimbursement (August 1987) -- as modified by 18-52.243-2 NASA FAR Supplement (April 1984) -- Alternate V (April 1984) of this contract. (Reference Advanced Solid Rocket Motor - External Tank Relocation Requirements Document dated August 13, 1990 Revision A prepared for planning purposes.) The period of performance for this ASRM support is April 25, 1991 through December 21, 1992.

ATTACHMENT J-4

GOVERNMENT-PROVIDED FACILITIES, PROPERTY & SERVICES

A. During the performance of this contract the Government will provide, on a no charge basis: (i) the Government-Provided Property/Services identified in Appendix I to this attachment; (ii) the Government Facilities and General Purpose Equipment in accordance with Contract NAS8-30382(F), NAS8-36747(F), NAS8-39243(F) and F33657-77-C-0140 or their successor contracts; (iii) Special Tooling, Special Test Equipment and Transportation Support Equipment provided under Contracts NAS8-30300 and NAS8-33708 or their successor contracts; and (iv) those Facility Self-Sustaining Services (FSS) procured pursuant to NAS8-33708 as "total effort" required through April 24, 1991.

B. Under the terms and conditions of prior contracts, the Contractor has mission responsibility for fabricating and/or acquiring the Special Tooling, Special Test Equipment and Transportation Support Equipment (except for Advanced Manufacturing Technology Tooling, Transporter/Rotational Equipment, Marginal Tools (T05A5018 and T05A5019) required for producing External Tanks at a rate of 24 per year (See Attachment J-1, paragraph 2.6). Under the terms and conditions of Schedule C Contract NAS8-30382(F), Attachment J-3 of NAS8-36747(F), Attachment J-4 of NAS8-39243(F) or their successor contracts, the Government will provide the physical plant facilities of the Michoud Assembly Facility for use in the fabrication, assembly, test and delivery of External Tanks. Construction projects have been or are being completed, enabling the MAF physical plant facilities to be maintained in a good state of repair and to allow for the continued and efficient production of External Tanks.

C. Under the terms and conditions of Attachment J-1 of NAS8-36747(F) and Attachment J-2 of NAS8-39243(F) or successor contract, the Government will provide the general purpose plant equipment as identified therein on the date of this contract. General-purpose plant equipment is defined as equipment not otherwise classified as Special Tooling, Special Test Equipment or Transportation Support Equipment. Under Attachment J-2 of NAS8-36747(F) and Attachment J-3 of NAS8-39243(F) or successor contract, the Government will provide for rehabilitation, as required, of the equipment provided under Attachment J-1 of NAS8-36747(F) as identified in Appendix II and Attachment J-2 of NAS8-39243(F).

APPENDIX I
TO
ATTACHMENT J-4
GOVERNMENT-PROVIDED PROPERTY/DATA/SERVICE

- (i) A list of Government-Provided Property/Data/Services is provided in Appendix I.
- (ii) The documents incorporated herein by reference lists below provide a "by-item" listing for the following GFP items:

Special Tooling	DBC1-R51A	10/07/92
Special Test Equipment	DBC1-R46A	10/07/92
Transportation Support Equipment	DBC1-R44A	10/07/92
Plant Equipment	DBC1-R24A	10/07/92
Supplier Tooling	DBC1-R05A	10/09/92
Real Property Summary	MA26	12/31/91

Tooling fabricated under Contracts NAS8-30300 and NAS8-33708 and not presently being used will be added to the above documents when first usage of the tool has occurred upon completion.

- (iii) The government and the contractor have agreed to establish a Schedule Interface Log (SIL) to identify contractual required dates for providing Government Furnished Property and Services identified in this Attachment J-4. Identified dates will be changed only as requirements change by mutual agreement of the parties.

It is mutually agreed that the SIL will be formatted as follows:

- (a) The required dates for GFP items which are identified in the following Sections of Attachment J-4 will not be reflected in the SIL:

Section A - Tank Transportation

Rationale: Scheduled by NASA/MSFC as required to support Launch operations at KSC.

Section B - Propellants and Pressurants

Rationale: DPD 660 - DR MA11 requests and forecasts propellant and pressurant requirements.

Paragraph (iii)(a) (Continued)

Section C - Computer and Data Service (ADP)

Rationale: These requirements are identified in the mutually agreed to documents: "ET Project Data Systems Long Range Plan" and the "Memorandum of Understanding between the NASA Automated Data Processing Consolidated Center (NACC) MSFC and Lockheed Martin (LMMSS)" dated September 11, 1996, Version 1.1.

Section H - Telecommunications

Rationale: Obtain on an as needed basis through the ET Resident Office at MAF.

Section I - Composite Nose Cone Manufacture

Rationale: These requirements are identified in Engineering Change Proposal B01775D dated January 21, 1993, or as modified by subsequent mutual agreement of parties.

(b) Spares for other Categories of hardware, i.e., transportation equipment, flight and major test article hardware will be reflected in the appropriate section of Attachment J-4 or the SIL for which they are required to support.

(c) Lockheed Martin Michoud Space Systems interface and coordination of requirements and schedule need dates will be with and through the MSFC ET Project, USA, and Resident Offices.

APPENDIX I TO ATTACHMENT J-4
GOVERNMENT-PROVIDED PROPERTY/DATA/SERVICES

CONTENTS

SECTION

A

Tank Transportation

B

Propellants and Pressurants

C

Computer/Data Services (ADP)

D

Special Tooling

E

Special Test Equipment and Test Tools

F

Documentation

G

Flight Article Hardware

H

Telecommunications

I

Composite Nose Cone Manufacture

J

Government Provided Services

ATTACHMENT J-4

SECTION "A"

TANK TRANSPORTATION

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	<u>IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
-----------------	---------------------	---	-----------------

Modify Item 1 of Section A as follows (changes noted in bold print):

- | | | | |
|----|--|--|---|
| 1. | Water Transportation Barges | | 1 |
| | A. Pegasus barge and barge support equipment
(Barge and barge tie-down equipment to be provided by NASA) | To transport flight articles to launch site. | |
| | B. Poseidon barge and barge support equipment
(Barge and barge tie-down equipment to be provided by NASA) | To transport flight articles to launch site. | 1 |

SECTION "B"

PROPELLANTS AND PRESSURANTS

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	<u>IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
1.	Propellant Pressurizing Agent, Nitrogen Type I, Gaseous	MIL-P-27401C	*and Note 1
2.	Propellant Pressuring Agent, Helium	MIL-P-27407 (USAF)	*and Note 1
3.	Propellant Pressurizing Agent, Nitrogen Type II - Liquid	MIL-P-27401C	*and Note 1
4.	Helium Type II - Liquid	MSFC-SPEC-364C	*and Note 1

* Required in sufficient quantities and in time to support delivery and operation. Refer to MA11b for detail delivery requirements.

NOTE 1 - The above listed GFP propellants and pressurants are for Contractor's use only. Propellants and pressurants for Lockheed Martin Subcontractors and their subcontractors shall be Contractor furnished.

SECTION "C"

COMPUTER/DATA SERVICES

EQUIPMENT AND SERVICES REQUIRED/PROVIDED AND/OR OPERATED BY THE GOVERNMENT

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	<u>LOCATION</u>	<u>QUANTITY</u>
1.	<u>Mainframe Computing Services:</u> IBM compatible mainframe computing services required to run ET business and technical software applications. This includes processors, mass storage devices, back-up devices, operating systems software, utilities, libraries, common use applications, 24 hr/7 day operations support, offsite backup storage, and other associated software and hardware required for on-line batch processing applications.	KSC, MSFC and MAF	See Note
2.	<u>Scientific Computing Services:</u> VAX and Cray scientific or equivalent computing services required for design and analysis of ET hardware. To include processors, mass storage devices, back-up devices, operating system software, utilities, libraries, 24 hr/7day day operations support, offsite backup storage, and other associated software and hardware required for on-line and batch scientific applications.	KSC, MSFC and MAF	See Note
3.	<u>Communications Services:</u> a. Inter Center communications services between MAF and MSFC to support items 1 and 2 above to include TCP/IP, SNA connectivity and IBM channel extension. b. Inter Center communications to all other NASA centers. c. World-wide internet connectivity.	KSC, MSFC and MAF	See Note

SECTION "C" (Continued)

COMPUTER/DATA SERVICES

EQUIPMENT AND SERVICES REQUIRED/PROVIDED AND/OR OPERATED BY THE GOVERNMENT

ITEM
NO.

NOMENCLATURE

LOCATION

QUANTITY

NOTE:

The above services (Line Items 1-3) shall be as established by MOU between the NASA Office of Space Flight Automated Data Processing Consolidated Center and Lockheed Martin (LM Reference 94MO-0805): Lockheed Martin will forecast yearly and 5 year projections of computer utilization, tape usage and disk storage requirements/needs and submit to NASA. NASA shall monitor usage and plan for increases or decreases in use. SHOULD A FAILURE ON THE GOVERNMENT'S PART CAUSE LOSS OF FACTORY PRODUCTION OF MORE THAN 24 HOURS, A CLAIM SHALL BE PROCESSED IN ACCORDANCE WITH "GOVERNMENT PROPERTY CLAUSE".

4.

ADPE Equipment and Maintenance:

MSFC

See Note below

- a. Office environment desktop computers and associated equipment

NOTE: All office environment desktop computers and associated equipment that was provided by the NAS8-39243(F) Contract, or its successors, and transferred to NASA/MSFC Information Management System Accountability by DD1149.

SECTION "D"

SPECIAL TOOLING

ITEM NO.	NOMENCLATURE	IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION		QUANTITY
		R/I Tool No.		
1.	Interface tooling to support liquid level sensors and engine cut off sensors			
	*A. Thermal Shock Fixture	J111141		1
	*B. P.C.B. Environment. chambr.	T7478148		1
	*C. Speed Response Fixture	J111140		1
	D. Swagging Tool			3
	*E. Sensing Wire Slack	T7498124		1
	F. Forming Block	T7498125		2
	*G. Swagging Tool	T7498126		1
	*H. Holder	T7498127		4
	I. C Bore & Stack Fixture	T7498133		1
	J. Drill Jig	T7498134		1
	K. Lathe Fixture	T7498135		1
	L. Fixture	T7498136		1
	*M. Sensor Wire Winding Jig	T7498143		1
	*N. Par, Gap Weld Electrode	T7498144		1

*NOTE: Items A, B, C, E, G, H, M & N will require joint usage with Boeing North American

SECTION "D" (Continued)

SPECIAL TOOLING

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	<u>IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
2.	Special tools to support lapping of the ET/ORB Aft Umbilical Disconnect Assy Flanges (17" and 2")		
	A. Lapping tool, disconnect Model A78-5202*	P/N GW78-505202-001	1 ea
		Consisting of:	
		P/N 1395-515 Tool Set (T19-0058)	1 ea
		P/N 1414-BSC Tool Set (T19-0058)	1 ea
		P/N 1395-515 Tool Set (T19-0062)	1 ea
		P/N C14-298-2 Tool Set	1 ea
		S/N's 5790012 5790013 5790014 5790015	
	B. LH2/LO2 Umbilical Stand (Frame)	P/N 11EH-F-1033-XXX (T7181137-XX and/or T7181138-XX)	1 ea
	C. LH2/LO2 Umbilical Stand (Dolly)	P/N 11EH-F-0302-XXX or equivalent (T7180364-XX)	1 ea

*Supports Section G, Item 1.

SECTION "D" (Continued)

SPECIAL TOOLING

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	<u>IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
3.	Spare tools to support the installation and production processing of the ET/ORB Aft Umbilical Disconnect Assys (See Section "G", Item No. 1)		
	Rosan Insert Tools		
	A. 2" & 4" Disc Drive Wrench	P/N SR25W-A	1 ea
	B. 2" & 4" Disc Swage Tool	P/N SR25S-A	1 ea
	C. 2" & 4" Disc Removal Tool	P/N SR25R	1 ea
	D. 17" Disc Drive Wrench	P/N SR43W-A	1 ea
	E. 17" Swage Tool	P/N SR43S-A	1 ea
	F. 17" Removal Tool	P/N SR435-A	1 ea

SECTION "E"

SPECIAL TEST EQUIPMENT AND TEST TOOLS

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	IDENT. NO., PART NO., DRAWING NO. OR <u>REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
1.	LO2 ET Disconnect Cover Plate Set	GW78-405201-XXX*	**
2.	LH2 ET Disconnect Cover Plate Set	GW78-405200-XXX*	**
3.	NASA Standard Initiator, Type 1, (NSI-1), (Initiator to Mate with a NBS9E - Connector) for test of Separator Bolt, PD5000020	JSC P/N SEB 26100001-216	
	1. First Lot Buy		
	(a) Pressure Cartridge Lot Acceptance Test (LAT)		10
	(b) Load Verification		3
	(c) Annual Integrity Test at Launch Site		7
	(d) Separator Bolt Lot Acceptance Test (LAT)		10
	2. Second Lot Buy		
	(a) Pressure Cartridge Lot Acceptance Test (LAT)		10
	(b) Load Verification Test		3
	(c) Annual Integrity Test at Launch Site		7
	(d) Separator Bolt Lot Acceptance Test (LAT)		10

* Installed on Item 1 of Section "G" NOTE: All subtier parts and assemblies are listed in the Lockheed Martin Schedule Interface Log (SIL) and reflect the current approved configuration. Also the SIL will continue to reflect appropriate effectivities.

** One per Ship Set for Item 1 of Section "G".

SECTION "E" (Continued)

SPECIAL TEST EQUIPMENT AND TEST TOOLS

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	<u>IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
3.	Third Lot Buy		
(cont)	(a) Pressure Cartridge Lot Acceptance Test (LAT)		10
	(b) Load Verification Test		3
	(c) Annual Integrity Test at Launch Site		7
	(d) Separator Bolt Lot Acceptance Test (LAT)		10
4.	Seals	VIT500-18.049 VIT500-13.275	3** 3**
5.	Hardware required to support implementation of the 4 and 7 year ordnance testing for the GUCA to satisfy NSTS 08060 Specification Document: NASA Standard Initiator for Test of Pressure Cartridges, Separator Bolt Assy (GUCA), PD 5000020	JSC SEB 26100001-216	
	FIRST LOT BUY		
	**1) 4 - Year Test		5 each
	**2) 7 - Year Test		5 each
	SECOND LOT BUY		
	**1) 4 - Year Test		5 each
	**2) 7 - Year Test		5 each

**NOTE: Are to be flight certified

**Total of three each to be maintained in stock at all times to support testing.

SECTION "E" (Continued)

SPECIAL TEST EQUIPMENT AND TEST TOOLS

ITEM NO.	NOMENCLATURE	IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION	QUANTITY
6. MSFC	VPPA Weld Stations #1 and #2 in Bldg. 4711 Weld Lab		
7. MSFC	Weld Station #3 and #4 Weld Lab in Bldg. 4705 Vertical Tool Area		
8. MSFC	Secured Storage area of 1,000 sq. ft. with forklift access in MSFC Bldg. 4711 Weld Laboratory		
9. MSFC	Bldg. 4711 X-ray Facility X-ray Machine X-ray Film Processor	NASA Bar Code #G29940 NASA Bar Code #733241	1 1
10. MSFC	CNC Milling Machine Bridgeport Mill in Bldg. 4711 Weld Laboratory	NASA Bar Code #1151613 NASA Bar Code #102331	1 1
11. MSFC	Delta Qualification Test hardware Linear Shaped Charge (LSC) from KSC surplus stock	PD5000016-050 PD5000016-059	1 1
12. MSFC	Vertical Weld Pedestals	30A72341 30A72283-5-101	8 2

SECTION "F"

DOCUMENTATION

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	<u>IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
1.	Component Data package for all items in Section "G" (to include each applicable item of the following documentation or notation that the requirement is not applicable.)		1 set w/each hardware component delivered
	A. Component Log Book		
	B. Identification of Limited Life/Time or Age Sensitive Items		
	C. Time and Cycle Data		
	D. Waivers and Deviations		
	E. Quality Acceptance Reports		
	F. Traceability Data for Parts & Material Control		
	G. Calibration Curves		
	H. Temporary Installations		
	I. LO2 Compatibility Batch Test Certification		
	*J. Open Discrepancy/Failure Reports or Waivers		
	*K. Applicable Open NASA Alerts		
	L. Shortages		
	M. Continuity and Isolation Resistance Test Data for the Connector Saver for Items No. 1, Section "H"		

* To identify NASA organization responsible for resolution and schedule data for closeout data to be provided to MAF.

SECTION "F" (Continued)

DOCUMENTATION

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	<u>IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
2.	Certificate of Qualification/equivalent certification for all items listed in Section "G".		1 COQ for ea. item identified in Section "H".
3.	Data to provide pre-flight actual weight for End Item performance evaluation		1 per CEI
	A. The report shall provide a record of the item's weight & balance configuration at the time of first major measurement at KSC & shall include the following elements of data:		
	1) Results of the measurements including CEI weight, internal & external temperature & pressure, relative humidity, & type of gas in each propellant tank.		
	2) List of installed non-flight and temporary installed hardware identifying the location of each item.		
	3) List of flight items not installed & deferred work not accomplished		

SECTION "F" (Continued)

DOCUMENTATION

ITEM NO.	NOMENCLATURE	IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION		QUANTITY
4.	Space Shuttle Mass Properties Status Report	SD72-SH-0120		1 Set
5.	SRB MASS Properties Status Report			1 Set
6.	System Math Model Format			1 Set
7.	MSFC Facilities Test Equipment Drawings			1 Set
8.	KSC & VAFB Launch Operations Information			1 Set
	A. Integrated Test Procedures			1 Set
	B. Test & Flight Reports			
	C. Integrated Checkout, Control and Launch Systems Data (LPS System Design Definition)			
9.	Shuttle Integrated Measurement List			1 Copy
10.	EEE Parts Selection & Application Guidelines for Space Shuttle			6 Sets
11.	Measurement Numbering System & Telemetry Channel Codes			1 Set
12.	KSC Propellant Loading System Control Block Diagram & Logic Design Data			1 Set

SECTION "F" (Continued)

DOCUMENTATION

ITEM NO.	NOMENCLATURE	IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION		QUANTITY
		REQUIREMENT DESCRIPTION		
13.	FMEA, Hazard Analysis on STE, TSE, CSE & GSE	FMEAs performed to verify fail safe designs		1 Set
14.	All NSTS 07700 Primary and Secondary Documents			1 Copy w/Updates
15.	Government Furnished ET Components (GFP Flight Hardware in Section "G")			
	A. Procurement Drawings & Changes			1 Set w/Updates (Reproducible)
	B. Production Drawings & Changes			1 Set w/Updates (Reproducible)
	C. Qualification Test Plans & Procedures			1 Set w/Updates (Reproducible)
	D. Acceptable Test Plans & Procedures			1 Set w/Updates (Reproducible)
	E. Specifications (including EEE & Mechanical Parts)			1 Set w/updates (Reproducible)
	1) List of all Gov't Specs.			
	2) Copies of all Vendor Specs.			
	F. Advance Notification of Qualification Tests			1 Set w/Updates (Reproducible)
	G. Results of Qualification Tests			1 Set w/Updates (Reproducible)

SECTION "F" (Continued)

DOCUMENTATION

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	<u>IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
15. (Cont)	H. Identification of STE, TSE & CFE Required for Handling, Inspection, Installation, Maintenance & Checkout		1 Set w/Updates (Reproducible)
	I. Procedures for Handling, Storage, Checkout, Mounting, Installation Normal Maintenance, Removal, Replacement, Repair & Cleaning		1 Set w/Updates (Reproducible)
	J. Safety Requirements		1 Set w/Updates (Reproducible)
16.	SSP Level I & II Change Paper (PRCBDs, Change Request, IRNs, PIRNs, NSTS 07700 changes, letter request, etc.)	N/A	As Issued
17.	Structural Design Load Data Book	SD-73-SH-0069-3D & Updates as Issued	As Issued
18.	LO2 Propellant Mass Load	TBD	
19.	All GSE Dwgs. & Specifications for Aft Umbilical Carrier Plate Protective Covers (P/N C78-5200 & C78-5201)	TBD	1 Set
20.	Tooling Drawings for Aft Support Structure Orbiter/ET Interface Control Tool (P/N T7210012)	N/A	1 Set

SECTION "F" (Continued)

DOCUMENTATION

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	IDENT. NO., PART NO., DRAWING NO. OR <u>REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
21.	Reproducible Drawings for Adapter Assy., Electrical Connector, MSFC #14A00635-1, Rev. B	Dwg #14A00635, Rev. B Dwg #14A00646, Rev. A, EO-1 Dwg #14A00647, Rev. A Dwg #14A00648, Basic (Plus any revisions thereto)	1 Set
22.	GSE Drawing & Usage Instruction for Special Tool (Device) for Actuation of 17" Q/D Valve	TBD	1 Set
23.	Space Shuttle Performance Enhancement Certification Aerodynamics Heating Data Book, Superlightweight Tank, Ascent	RI Report SSD 95D0489 dated October 1996	1
24.	Space Shuttle Generic ETR Plume Heating Data Book, External Tank, Ascent	RI Report SSD 90D0016 dated July 22, 1994	1
25.	Data Required to Perform the Analysis for ET Entry Breakup & Debris Disposal. Data to be provided on Magnetic Tape, Optical Recording or any other source of recording		1 Set NSTS-07700-10-MVP-01
	A. Ascent Environments - Base		1 Set
	B. Entry Trajectories - Base		1 Set

SECTION "F" (Continued)

DOCUMENTATION

ITEM NO.	NOMENCLATURE	IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION	QUANTITY
26.	Loads Definition Data to include the following plus updates:		
	A. Updated Critical Design Loads, Document in Updated Loads Data Book STS-85-0169, Vol. 3 (Received NASA/MSFC Letter GP43-71-94 dated 8-12-94)		1 Set
	B. Updated Final Design Loads for incorporating into "SLWT Structural Load Indicators and Capabilities" (Algorithms)		1 Set
	C. Ullage pressure updates due to SLWT performance or other operations unique to SLWT. Incorporate in updated ICD-2-12001 and ICD-2-0A002.		1 Set

SECTION "F" (Continued)

DOCUMENTATION

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	<u>IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
27.	Ascent Data (Worst Case Nominal, TAL, 3RTLs) to include the following:		
	A. Ascent Trajectories, Updates to trajectories defined in RI letter 90MA-4385 and JSC letter WE2-91-113		1 set*
	B. Appropriate updates to STS 90 D90 D0016 (ET Plume heating Data Book)		1 set*
	C. Appropriate updates to STS 90 D0336 (ET Aerodynamics Heating Data Book)		1 set*
	D. Appropriate updates to SD74-SH-0144, Rev. F for Thermal Interface Design Data		1 set*
	E. Ascent Venting Trajectories		1 set*
	F. MPS Ascent Trajectory Set		1 set*
	G. Nominal Ascent Aero Heating and Plume Heating Definition for Use in Disposal Certification		1 set*

* Schedule dates required will be incorporated into the Schedule Interface Log (SIL).

SECTION "F" (Continued)

DOCUMENTATION

<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	IDENT. NO., PART NO., DRAWING NO. OR <u>REQUIREMENT DESCRIPTION</u>	<u>QUANTITY</u>
28.	Entry Data to include the following:		
	A. Appropriate updates to Entry Trajectory Data Sets for TAL.		1 set*
	B. Appropriate updates to Entry Trajectory Data Sets for RTLS.		1 set*
	C. Appropriate updates to Entry Heating Trajectory Data Sets for No-Fail (Nominal Heating).		1 set*
29.	FMEA & CIL (Part Level for Critical Items)		1 set w/updates (Reproducible)*
	1) ET/ORB EIFA		
	2) SRB/ORB EIFA		
	3) Orbiter MPS FMEA/CIL		
	4) Separation System FMEA/CIL		
	5) 17" Disconnect (Supplier FMEA)		
	6) Feedline Manifold Upstream of Prevalves Supplier FMEA		
	7) 4" Disconnect (Supplier FMEA)		
	8) 2" Disconnect (Supplier FMEA)		
	9) ET Ullage Pressure Signal Conditioner (Supplier FMEA)		

* Schedule dates required will be incorporated into the Schedule Interface Log (SIL)

SECTION "F" (Continued)

DOCUMENTATION

ITEM NO.	NOMENCLATURE	IDENT. NO., PART NO., DRAWING NO. OR REQUIREMENT DESCRIPTION		QUANTITY
30.	Test reports required to support qualification test and checkout of the new hose liners for LO2/LH2 Ullage Titeflex hoses			
	A. LOX Compatible Samples at MSFC	N/A		1 ea*
	B. Nomex Coverings Flammability Samples at MSFC	N/A		1 ea*
	C. Qualification Test Report for Flex Hoses	N/A		1 ea*
31.	Test reports required to support Hot Gas Testing for Re-qualifying Graphite Epoxy Material			
	A. Hot Gas Test of PrePreg Material	N/A		1 ea*
	B. Hot Gas Test of Hexcel Material	N/A		1 ea*
32.	Test reports required after testing at NASA/MSFC and AMES test facilities to support qualification of the BX-265 Material:			
	A. Process and Qualification Test for BX-265 (Lot 3) Material at MSFC and AMES	N/A		1 ea*
	B. Flight Support Requirements for BX-265 (Lot 3) Material at MSFC and AMES	N/A		1 ea*
	C. Process and Qualification for BX-265 (Lot 4) Material at MSFC and AMES	N/A		1 ea*
	• Test results are required four weeks after the actual tests are performed			

* Schedule dates required will be incorporated into the Schedule Interface Log (SIL)

SECTION "G"

FLIGHT ARTICLE HARDWARE

- NOTE:
1. THIS SECTION CONTAINS GFP FLIGHT HARDWARE REQUIREMENTS FOR ET-61 THROUGH 121.
 2. THE NEED DATES FOR THE HARDWARE LISTED IN THIS SECTION SHALL BE MUTUALLY AGREED TO BY MSFC AND LOCKHEED MARTIN AND ARE REFLECTED IN THE EXTERNAL TANK PROJECT SCHEDULE INTERFACE LOG.

<u>ITEM NO.</u>	<u>NOMENCLATURE AND PART NO.</u>	<u>FLIGHT ARTICLES</u>	<u>SPARES</u>	<u>TOTAL</u>	<u>DELIVER TO</u>
1.	Umbilical Carrier Plate Assembly				
A.	LH2 Disconnect*				
	V527-415267-037	60	**	60	MAF
	V527-415267-044				
	V527-415267-045				
	V527-415267-048				
	V527-415267-050				
	V527-415267-052				
	V527-415267-055				
	V527-415267-056				
	V527-415267-057				
B.	LO2 Disconnect*				
	V527-415273-031	60	**	60	MAF
	V527-415273-032				
	V527-415273-033				
	V527-415273-035				
	V527-415273-036				
	V527-415273-037				
	V527-415273-038				
2.	Seals (To support installation of Item 1 above)				
A.	P/N ME 261-0045-0017		6***		MAF
B.	P/N ME 261-0045-0006		5***		MAF
C.	P/N ME 261-0045-0023		5***		MAF
D.	P/N ME 261-0045-0019		5***		MAF

SECTION "G" (Continued)

FLIGHT ARTICLE HARDWARE

<u>ITEM NO.</u>	<u>NOMENCLATURE AND PART NO.</u>	<u>FLIGHT ARTICLES</u>	<u>SPARES</u>	<u>TOTAL</u>	<u>DELIVER TO</u>
3.	NSI Standard Initiator (P/N SEB 26100001-261) (2 ea.) (GUCA)	120	14	134	Hishear
4.	ET/SRB Forward Attachment Bolt Catcher P/N 30A90901 or 10175-0001-101 or 10175-0001-102; P/N 10175-0001-103	60	0	60	MAF
5.	Rosan Inserts	60	2	62	MAF
	A. P/N SR258L-0024			112****	MAF
	B. P/N 5753270-108			48****	MAF
6.	Seal P/N ME261-0033-0202 to support inspection of leak parts on the LO2/LH2 Umbilical Assys. (Boeing North American to supply upon request)	50	-	50	MAF

- * All subtier parts and assemblies are listed in the Lockheed Martin Schedule Interface Log (SIL) and reflect the current approved configuration. Also, the SIL will continue to reflect appropriate effectivities.
- ** Minimum two build ahead units to be available in stock.
- *** To be available in stock at all times.
- **** Minimum quantity to be available in stock at all times at MAF.

SECTION "H"

TELECOMMUNICATIONS

ITEM
NO.

NOMENCLATURE

1. All telecommunications services required to operate the MAF.

SECTION "I"

COMPOSITE NOSE CONE MANUFACTURE

ITEM
NO.

NOMENCLATURE

1. Government furnished facilities and equipment at MSFC required for the manufacturing of the composite nose cone as identified in the Contractor's Engineering Change Proposal B01775D-R3 dated June 16, 1995.
2. Nine (9) reusable shipping containers to protect the nose cone during shipment.

SECTION "J"

GOVERNMENT PROVIDED SERVICES

ITEM
NO.

NOMENCLATURE

1. Friction Plug "Pull" process weld repair allowables as identified in the Friction Plug Welding Allowables and Characterization Test Plan #FPWTP-98-012 Revision F in PCP B81483-R1 **ITEM 1 CANCELLED- MOD650**
2. Test Facility available to support the qualification of the new hose liners for the LO2/LH2 Ullage Titeflex hoses
 - A. LOX Compatible Samples Testing at MSFC
 - B. Nomex Coverings Flammability Samples Testing
 - C. Qual Test Facility Availability at MSFC
 - D. Conduct qualification Testing at MSFC
3. Use of Hot Gas Facility to support qualification of the Graphite Epoxy PrePreg Material
 - A. Conduct Test of NASA PrePreg Material at MSFC Hot Gas Test Facility
 - B. Conduct Hot Gas Testing of Hexcel Material at MSFC Hot Gas Facility
4. Use of NASA/MSFC and AMES Test Facilities to Support Qualification of the BX-265 Material
 - A. Conduct Test Supporting the Process and Qualification for BX-265 (Lot 3) Material at MSFC and AMES
 - B. Conduct Test Supporting the Flight Support Requirements for BX-265 (Lot 3) Material at MSFC and AMES
 - C. Conduct Test Supporting the Process and Qualification for BX-265 (Lot 4) Material at MSFC and AMES

* Schedule dates required will be incorporated into the Schedule Interface Log (SIL)

SECTION "J" (Continued)

GOVERNMENT PROVIDED SERVICES

ITEM
NO.

NOMENCLATURE

5. Use of NASA/MSFC and AMES test facilities and necessary hardware to perform the required testing for the Implementation of NCFI 27-68

A. Conduct Test Specimen Sprays at the Hot Gas Facility Supporting the Process and Implementation of NCFI 27-68

35 Nominal, 12 Thick/Thin Fab LH2 Test Specimens
6 High, 6 Low Fab LO2 Ogive Test Specimens
15 Vented, 15 Not Vented Fab I/T Test Specimens

B. Conduct Test Fab Specimen Thermal Acoustics Testing Supporting the Implementation of NCFI 27-68

3 Nominal Fab Test Specimens

C. Conduct Test Fab Specimen Vacuum Chamber Testing Supporting the Implementation of NCFI 27-68

12 Nominal, 8 Thick/Thin/Flat/Vented Fab Test Specimens
8 Flat/Vented Fab Test Specimens
20 Flat Vented, 10 Ribbed/10 Hat/Fab Test Specimens

D. Conduct Test Specimen Sprays Flammability Testing Supporting the Implementation of NCFI 27-68

3 Nominal Fab/Cure Flammability Test Specimens
6 Nominal Fab/Cure LH2 Flammability Test

E. Conduct Test Specimen for Lot 3 Qual Testing Supporting the Implementation of NCFI 27-68

3 Nominal Fab/Cure LH2 Combined Env. Test Specimens

* Dates Required: Schedule dates required will be incorporated into the Schedule Interface Log (SIL)